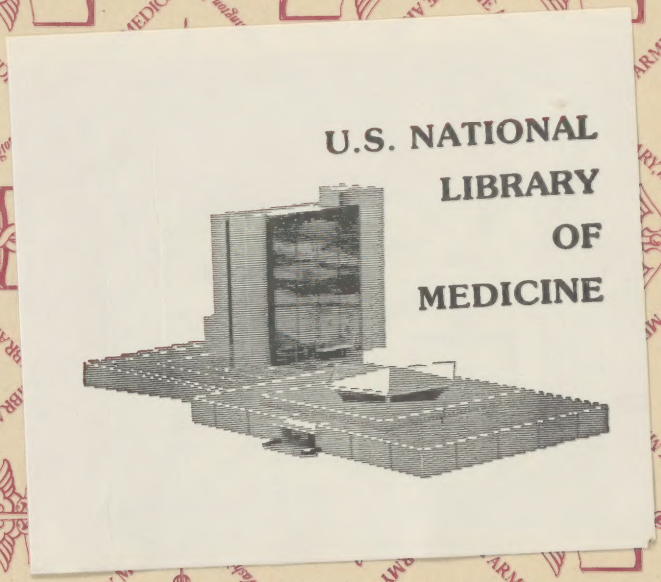

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CHAPTER VII

THE MARSHALLS

The success of American offensive operations in the south and central Pacific during 1943 made possible the launching of new attacks early in 1944. The early months of the new year found Allied forces pressing a two-pronged campaign against the Japanese -- in the New Guinea theater on the one hand, and in the Marshall Islands theater on the other.

Medical personnel who participated in the northernmost of these campaigns -- that in the Marshall Islands -- were able to profit from the lessons which the Navy Medical Department had learned in earlier amphibious operations, especially the Gilberts Islands campaign. The problems confronting them in these two operations were generally similar.

The Marshall Islands campaign will be discussed under four general headings: (1) the seizure of the Kwajalein, (2) Eniwetok, (3) Majuro Atolls, and (4) the reconnaissance of the lesser Marshalls and the elimination of the Japanese occupying these atolls.

Kwajalein

Kwajalein Atoll, the largest of the Marshalls, lies on a northwest - southeast axis and surrounds a lagoon nearly 65 miles long. The maximum width at the center is about 18 miles and the circumference is approximately 154 miles. There are three principal islands: Roi, Namur and Kwajalein. Intelligence had estimated that there

were approximately 24,000 enemy troops in the Marshalls' area, the bulk of the Japanese being on Kwajalein, Wotje, Maloelap and Mille Atolls, with an estimated 2,700 to 3,100 on Roi and Namur and 7,100 on Kwajalein and the surrounding islands.

The operations involved complete cooperation by the Army, Navy, and the Marines. As this work has as its primary function the nafration of the activities of the Medical Corps of the United States Navy in the Marshalls campaign, particular emphasis will be placed on the part played by the Navy and by the Marines.

Kwajalein Atoll was assaulted by two separate forces under the Commanding General of the Fifth Amphibious Corps: the Northern Landing Forces and the Southern Landing Forces.

The Fourth Marine Division, which was to play such an important part in this campaign, was activated at Camp Joseph M. Pendleton on 14 August 1943. Four Camp Pendleton dispensaries were taken over in their entirety for the care of the division troops. These dispensaries were manned by the medical company personnel, and in retrospect, proved to be a favorable factor in their training. Each medical company rotated in dispensary and field training. In the field they were obliged to utilize all materiel and personnel attached to the company, and they were encouraged to experiment with new ideas in the evacuation of casualties and in the employment of materiel.

During this period the major portion of the Fourth Marine Division supplies and equipment were received and distributed with

particular emphasis on the requirement that each member of the medical organization become familiar with his equipment and supplies. The entire personnel, with the exception of a minority who possessed a history of Fleet Marine Forces experience, had received essential training at medical field schools. This training was continued under the supervision of the commanding officer of the medical battalion and the regimental surgeon, and by medical participation in all field training. At the end of the training period of the basic medical personnel allowed, at least 20 percent were lost through transfers due to illness, disciplinary action, and Navy bureau orders. Malaria and filariasis accounted for the greatest loss of personnel with campaign experience.

The actual organization of medical units of the Fourth Marine Division was in accordance with the Marine Corps Table of Organization, with complements as authorized by the Bureau of Naval Personnel.[1]

Based upon the experiences at Tarawa, it was determined that greater bombing strikes and naval bombardment would be employed prior to the actual assault of the several atolls in the Marshalls. During the approach and final operations, carrier striking forces totalling 12 heavy and light cruisers, 8 new battleships, 3 heavy cruisers, 3 AA cruisers and 36 destroyers operated offensively throughout the Marshall Islands area, neutralized all enemy bases in the area, and covered the northern and southern forces from attack by superior enemy forces.[2]

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1. Distribution of Commanding General, Northern Landing Force ltr. of 17 Mar. 1944, p. 168.

2. Distribution of CTU 53.5.5, 25 Feb. 1944, p. 18.

In the bombardment of Wotje, the USS ANDERSON was hit by one enemy projectile which burst in its combat intelligence center killing her commanding officer, Comdr. J. G. Tennant, III, USN, two other officers, three men, and wounding eight others.[3]

Typical of the foresight and care exercised by the commanders of the various transports was the case of the APA, USS MONROVIA. Prior to departure the MONROVIA had brought all supplies and materiels up to full requirement, which were then dispersed according to previous plans. The litter units were placed mainly in one center area for ease in accessibility and security from rifling. The sick bay was expanded and work spaces were provided so that litters with patients could be transformed easily into convenient working first-aid tables. Moreover, aboard the MONROVIA a small blood bank was collected on D-day plus 2 and stored in the refrigerator for use during the operation.[4]

The trips from the various bases to the campaign areas were made without incident, and the crews and embarked troops were in excellent health. The USS COLORADO found that no arrangements had been made for the hospitalization or transfer of patients when it arrived at Lahaina Roads, T. H., en route to the Marshalls.[5] Also, there were cases of catarrhal fever noted and treated among several Marine units, and lice which had to be eradicated.

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3. Distribution of Commanding Officer, USS ANDERSON, 23 Feb. 1944.
4. Distribution of the CO, USS MONROVIA, 6 Mar. 1944, p. 29.
5. Distribution of the CO, USS COLORADO, 28 Feb. 1944, p. 5.

The over-all plan of the Navy Medical Department was broken down into supply, evacuation, and hospitalization. With reference to supply: (1) the medical detachments and units of the assault forces and elements of other forces accompanying the assault forces were ordered to carry medical supplies for 30 days, these supplies to be furnished by the normal supply agency from which the troops embarked;((2) resupply from ships and medical supplies ashore was to be in accordance with previously established practices; and (3) the emergency supplies of medical stores were to be from the mobile supply base located initially at FunaFuti and, when the tactical situation permitted, from the Galvanic area. Insofar as evacuation was concerned, the medical plan called for: (1) the commander of the Amphibious Force to be responsible for the evacuation of sick and wounded by surface vessels during the assault phase; (2) surface evacuation to be implemented by air evacuation as soon as practicable, with the air evacuation during the assault phase to be under the control of the Commander of the Air Forces of the Central Pacific; (3) land evacuation to be effected as transportation became available; (4) evacuation during the assault phase to be immediate. Upon completion of the assault phase and after establishment of adequate hospital facilities on each base, a 30-day evacuation policy was ordered with normal evacuation of the sick and wounded to be to Army and Navy hospitals on Oahu, T. H.[6]

On board all ships, other than heavy units of the fleet, the ship's company, except for gun crews, were ordered to administer first

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6. Distribution of Commanding General, Headquarters V Phib Corps, 7 Apr. 1944, p. 91.

aid and notify the bridge whether the casualty was a stretcher or ambulatory case. During battle conditions, the gun crews were to fight the ship and to consider everything else, including casualty handling, as a secondary matter.[7]

From 29 January 1944 until the Army and Marines were so firmly established ashore that only call-fire was possible, battleships, cruisers, destroyers, LCI's and other craft poured forth a crushing weight of shells upon the enemy installations. None of the islands escaped this rain of fire.

Despite the fact that there was some delay in landing the assault forces on D-day, 31 January 1944, and despite certain criticism levied by responsible personnel, it would seem that the initial landings were made in close conformity with the previously well conceived plans. During the first phase of the assault, the IVAN landing group, consisting of the 25th Marines reinforced, the 14th Marines, and attached division troops, secured the islands in the Kwajalein sector designated as JACOB, IVAN, ALLEN, ALBERT and ABRAHAM. The official action reports state that the casualties were very light. Some losses in personnel were sustained when tractors overturned on coral reefs.[8]

During these operations, medical personnel went ashore in support of their respective units. This plan involved landings on scattered beaches. The shore party medical sections and battalion aid

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7. Distribution of CO USS WILLIAM P. BIDDLE, 17 Feb. 1944, p. 51.

8. "Marshall Islands Operation," prepared by the Historical Division, U. S. Marine Corps, Feb. 1944, p. 11.

stations functioned smoothly and efficiently under difficult tactical conditions.

In the opinion of competent medical authorities a solution was demanded insofar as any future amphibious operations were concerned regarding the continuous operation of tractors by the same crews. It was estimated that 75 percent of the personnel operating tractors did so from 24 to 30 of the first 48 hours of the Kwajalein invasion. Continuous operation of tractors from 14 to 16 hours was not uncommon, and several Marine platoons participated in assaults on three separate islands in one day. Upon returning to their ships on the evening of 31 January, it was necessary for the tractor crews to refuel and service their vehicles in preparation for assaults on D plus 1 day, 1 February 1944. These men worked almost continuously at heavy labor during the period of assault. No sooner were the assaults completed than these same men were called upon to operate their vehicles in transportation of supplies and reinforcement troops.

During the assault period these men were under fire intermittently and were subjected to the nervous strain incident to the confusion experienced in beaching supplies. Reports were received from several officers that men fell asleep at their tractor controls whenever they were not in operation, and a few reports saying men vomited from sheer exhaustion. Only a few of the LST's provided warm food, hot coffee, and brandy to the officers and men returning from the beaches. It was found by the medical officers that these items of comfort, particularly brandy, were remarkably effective in improving psychological, if not

physiological, well-being.[9]

A great many men became sunburned about the face and other exposed areas and this condition was made worse by a constant spray of salt water. The clothing worn by the tractor crews was completely soaked with salt water during operations, and a number of the men developed severe cases of skin irritation where their clothing was tight, particularly around the ankles and feet. This skin irritation was generally accompanied by redness and swelling although the extremities themselves were cool. The suggestion was made by one of the battalion surgeons that this condition could be regarded as a form of immersion foot and given similar treatment. It is apparent that the officers and men did not have a sufficient appreciation of the necessity of changing clothing, washing in warm salt water, and obtaining early medical attention. Conjunctivitis was an early problem, having been induced by a combination of salt water spray and sun.

In the earliest phases of the operation, shipboard problems were not as many or as varied. The commanding officer of the USS MASSACHUSETTS arranged to have his officers and men divided into three watches before going to general quarters. These watches were stood on a three shift basis and were not rotated, thereby enabling each man to adjust his schedule so that he might obtain proper rest, necessary nourishment, and satisfy the requirements of nature without interfering with his watch standing. The U. S. Army type K ration was

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9. Distribution of Commandant of the Marine Corps, 3 Apr. 1944, p. 13.

issued for the noon meal on D-day, and proved entirely satisfactory. One problem that was apparent even on heavier fleet units was the falling of projectiles and fragments of projectiles near the supporting craft. In several instances men were wounded by projectiles which were fired from friendly ships. Such an accident occurred aboard the USS COLORADO during the bombardment and assault of Parry Island, Eniwetok Atoll.

Battleships were required to remain at general quarters for long periods and special emphasis was placed on relieving magazine crews at frequent intervals, ventilating the magazines as often as possible, and replacing empty powder can tops. A number of the battleships reported that intoxicating effects of powder fumes had been definitely noted. There were frequent burns inflicted on men who wiped burned powder from the hot plugs in the turrets, and recommendations were made that these men be furnished with asbestos gloves with long gauntlets attached.

As has been previously pointed out, a great number of destroyers not only assisted in the usual screening activities attendant upon any fleet movement, but also participated in supporting fire necessary to successful landings on the many beaches. Particularly on the destroyers was it considered advisable for personnel, even those between decks, to wear steel helmets and life jackets. Those men wearing helmets and jackets received only minor wounds that otherwise would have been fatal, whereas those without them were either seriously wounded or killed by similar fragments.

Throughout D-day the USS PORTERFIELD, USS HOPEWELL, and USS ELLET, as well as other fleet units, kept up an intermittent bombardment of Roi and Namur. This night bombardment was intended to harrass the Japanese and to prevent any rest rather than to produce any actual destructive results. It was directed against areas in which it was possible for concentration of personnel to be made and against those beaches in support of demolition parties. During the night of 31 January, the LST's remained at anchor in the lagoon, gassing their embarked LVT's and otherwise making preparations for the general assault of 1 February. At dawn of D plus 1 day the general bombardment of Roi and Namur was resumed, and its intensity was stepped up gradually during the hour immediately preceding the landing by the Americans. Roi was occupied in its entirety 1 February. Although little opposition was encountered on the beach of Namur, dogged resistance met the invader on the northern part of the Island, one-half of which had been secured by nightfall of that day. All organized resistance was overcome on Namur the afternoon of 2 February.

The 23rd Marines reinforced, who had landed on Roi and Namur respectively, had their own attached medical units which were boated in accordance with the principles of dispersal, and in general landed in the same wave as the unit commanding officer. There was one incident of a shore party medical section intended for support behind the lines, landing with the initial assault waves, owing to the confusion that obtained at the place of departure. As soon as landings were effected, battalion aid stations were set up on or near the beaches, utilizing deep shell craters, pill boxes, and dugouts.

During 1 February, the medical forces on Namur were subjected to enemy small arms fire, but according to reports, all hands performed well. On account of the small area involved in the operation, it was seldome necessary to move a battalion aid station after it had been initially set up. The battalion aid stations of the 23rd Marines on Roi were able to evacuate all casualties with hospital corpsmen acting as litter bearers. On Namur the 24th Marines experienced a much heavier casualty rate and it became necessary to employ bandsmen as additional litter bearers. Security for litter teams was sometimes provided by Marines who had been detailed for malaria control, with general security for the medical installations effected by the shore party and division troops.

A minimum amount of gear was taken ashore initially. Battalion aid stations carried splints, litters, plasma, morphine, suffa drugs, battle dressings, tourniquets, ophthalmic ointments, stretcher bandages, adhesive tape, burn ointments and brandy. Supplies of everything were adequate. It was suggested that in future operations, in addition to these items, small amounts of the following should be carried ashore: cotton applicators, tongue blades, chromic acid, adhesive tape (2 inch rolls), 2 percent gentian violet, paregoric, bismuth, campho-phenique, sulfa tablets, alcohol and tincture of merthiolate.[10]

The medical report of the Commanding General, Northern Landing Force, noted: (1) the moulded plywood splint was superior to other types; (2) oxygen and an apparatus for its administration must be

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10. Distribution of Commanding General, Northern Landing Forces, 19 May 1944, p. 171.

provided; (3) more plaster was required; (4) Leven or Wangensteen tubes were needed; (5) tracheotomy tubes and metal air-ways were desirable; (6) a folding litter stand for a battalion aid station, improvised by a Hawley orthopedic table, or some modified version, would prove of inestimable value; (7) large hemostats were needed in increasing numbers; and (8) catgut for abdominal cases would have been of great value.[11]

Generally the evacuation of casualties was excellent. The wounded personnel were cleared directly from the battalion aid stations to the ships and the average lapse of time from the firing line to the ship was three hours.

In connection with the Kwajalein operation, the comments of Lt. Comdr. T. G. Slagle, (MC), USNR, the senior medical officer aboard the USS HARRY LEE, are interesting:

> The medical department personnel consisted of 5 medical officers, one dentist and 23 hospital corpsmen. This included the beach party which was not called away from the ship as a unit and was available most of the time. The chaplain and a yeoman were also assigned to register casualties and to stow gear as received aboard-- this complement was found to be adequate for the number of casualties received. Experience gained in other operations was found by the senior medical officer to be invaluable in training corpsmen and suggestions of improvements in treatments and the handling of casualties. Considerable equipment was improvised of which one of the most valuable items was a limb refrigeration unit. Extra transfusion and gastric suction sets were made and a pool of type 'O'

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11. Distribution of ComGen, Northern Landing Force, 19 May 1944, p. 225.

volunteer donors was prepared for immediate use by check typing and Kahn reactions. Twenty wounded were received-- 18 Army and 2 Navy personnel-- in general the wounds were found to be less severe than those sustained by the casualties at the last operation in which this ship had participated. In most cases the evacuation from the beach was prompt and the first aid rendered there was good. None of the casualties was dead on arrival and only one was in extreme shock-- suffering from gunshot wounds of the lower back and chest, complicated by fracture of 2 vertebrae with paralysis of the lower extremities and profuse hemorrhage into the abdominal cavity-- man died a few hours after admission. The wounded were brought to the ship in DUKW's and boats on D plus 1, 2 and 3 days. Considerable difficulty was experienced in the removal of patients from the DUKW's as litter handles extended beneath the overhang of the gunwales of both sides and it is difficult to hoist them from a rocking vehicle without dropping them on the other wounded in the bottom.

All casualties received aboard were transferred to the hospital ship USS RELIEF on D plus 4 with the exception of one man who had died and another patient who was considered to be non-evacuable on account of a severed femoral artery, etc. It was recommended that efforts be made to further expedite casualty evacuation by using landing boats which are faster than the DUKW's. 12

The hospital ship USS SOLACE arrived on 3 February, and departed the following day with 362 wounded aboard. Most of these patients were received from transports and the bulk of them had been wounded not less than 48 hours prior to admission aboard this ship. The total casualties suffered by the 4th Marine Division were reported to be 737, consisting of 32 officers and 705

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12. Distribution of CO USS HARRY LEE, 9 Feb. 1944, p. 25.

enlisted personnel.

The majority of the ships that were employed in the Kwajalein operation were of the C-2 or C-3 type which had recently been converted to APA's. Their physical characteristics of accessibility

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13. A more detailed picture of casualties suffered by the 4th Marine Division follows:

Total Casualties of the 4th Marine Division

	Officers	Enlisted	Total
Wounded, evacuated	11	451	462
Wounded, not evacuated	8	77	85
Died of wounds	1	17	18
Killed	12	160	172
TOTAL	32	705	737

Casualties Received & Treated by the Medical Companies of the 4th Mar. Div.

A Company	52	*
B Company	154	
C Company	98	
D Company	74	
E Company	41	
TOTAL	419	

* Received while aboard the USS CALLAWAY

Classification of Wounds

Wound, gunshot, head	10	Wound, fragment, extremities	34
Wound, gunshot, face	14	Wound, lacerated, bayonet	1
Wound, gunshot, neck	7	Injury, crushing	3
Wound, gunshot, thorax	24	Fracture, simple	20
Wound, gunshot, abdomen	11	Fracture, compound	21
Wound, gunshot, extremities	122	Burn (not sunburn)	5
Wound, fragment, head	5	Psychosis, war	8
Wound, fragment, face	7	Misc.	116
Wound, fragment, abdomen	1	Blast, injury	10

(Distribution of the Commanding General, Northern Landing Force, May 1944, p. 172.)

of space to litter-borne casualties, ventilation, galleys, and messing facilities compared rather poorly with ships built as APA's or those that had been converted earlier in the war. In certain of the ships, alterations had been accomplished to make troop officers' messes and sick bays more accessible to litter-borne casualties. Most of the LST's used had only one hospital corpsman, although the authorized complement was two.

Prior to the operation, conferences were held with the division surgeon of the Fourth Marine Division to discuss the over-all medical problems of coordination, training, and logistics. This officer had been furnished with all pertinent directives and memoranda issued by Group Three, of the Fifth Amphibious Force. A list was prepared showing the amounts of all strategic supplies -- including Stokes litters, metal pole litters, and field blankets -- for use as a ready reference in emergency inter-ship resupply. There was a compilation of all medical officers with their specialties, together with the number of hospital corpsmen on each ship. Several beach battalion medical resupply units were placed on each LST as a reserve. Beginning on D-day the attack force medical officer worked from the flagship of the commander of transports, which permitted him to follow closely the problems of evacuation and care of casualties. The operations order assigned a boat to the attack force medical officer for use commencing on D-day, which vessel was identified by a small Red Cross flag displayed when approaching another ship.

An unfortunate accident occurred on an LST in that two cases

of accidental gonococcus infection of conjunctiva developed with the commanding officer and a signalman being the unfortunate victims. It was suggested that both cases resulted in cross-infection from use of binoculars.

It was found that LCVP's were better suited for transferring casualties from APA's to hospital ships (AH's) than the ambulance boats carried by the latter, inasmuch as the LCVP's had greater carrying capacity, afforded more protection from the sea, and could be hoisted to deck level to facilitate loading.

All of the action reports emphasized the value and use of salt by personnel operating in the tropics. In the treatment of certain wounds it was necessary to remove certain portions of the patient's clothing and in some of these cases rather severe sunburn occurred from exposure, particularly with respect to extremities.

Neither epidemics nor native diseases were encountered during the phase of occupation of Roi, Namur, Kwajalein and the surrounding islets. The majority of cases at sick call were sunburn, minor cuts and abrasions, and small pyrogenic infections of the skin believed to have resulted from the difficulty in keeping clean. However, none of these complaints was serious, and few were admitted for further treatment. One of the most painful and common causes of distress was the great incidence of lip sunburn with resultant cracking, pealing, and often ulceration. Those action reports which were reasonably complete were unanimous in the opinion that some satisfactory lip pomade should be issued to all personnel participating in any

tropical action.

The largest sanitary problem confronting the Americans was the speedy and effective disposition of the dead, particularly the enemy dead. Some of the Japanese had been dead for several days prior to 31 January. Many others were wholly or partially buried by debris in block houses and under bomb-proof shelters and were therefore very hard to remove. The stench resulting from the putrification of the mutilated bodies made the work very obnoxious. The American dead were buried on a site agreed upon both by the commanding general and the Island commander, located between Roi and Namur on a little spit of land known as Aqua Pura. The Graves Registration Section reported on 3 February, and by 4 February all the Marine and Navy dead who could be found had been properly buried.

The malaria and epidemic control team had a previously prepared plan for body disposal. Twelve 50-gallon drums of concentrated sodium arsenite solution and 25 knapsack sprayers assigned to the malaria control section were loaded prior to departure from shipboard and were landed on 2 February. On account of the transportation difficulties, three large bomb craters were designated on Namur as secondary burial sites, and deep trenches between the air strips dug by an engineering regiment were primarily utilized. There was inadequate officer supervision and the combat troops employed on the working details assigned to dispose of the dead felt that this sort of a chore was an imposition.

On Roi and Namur, the most common error noted was in the construction of heads. It was necessary in many instances to supervise actively and forcefully the construction of closed pit latrine boxes to insure their being fly-proof. There was a dearth of building materials and shovels. The galleys were not always located in the most advantageous spots, since they were frequently adjacent to the heads which were on porous soil. It was necessary to emphasize the desirability of covering the garbage dumped into shell holes as soon as possible. The Japanese sanitary facilities were notorious for their simplicity. No problem of sanitation presented in the Kwajalein area was new.[14]

The final report on the Marshall Islands operation, dealing specifically with the Kwajalein phase, made a number of justifiable criticisms and recommendations. Morphine syrettes in paper containers were soaked in salt water during the ship-to-shore movements, with the result that the cartons fell apart leaving the tubes without any protection and causing them to become a conglomerated mess. It was suggested that the syrette containers be dipped in paraffin. The combat details landed initially with a total of 200 units of plasma for aid stations, and it was recommended that 20 units to each station would be adequate for the original supply. Plasma was found to possess great and definite value in cases of battle fatigue and near hysteria. Lyster bags were not camouflaged or set up early enough. Aid stations

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14. CTF 53, 22 Mar. 1944, pp. 124-215; Distribution of the ComGen, Northern Landing Force, 19 May 1944, pp. 174-183; Distribution of the ComGen, Headquarters V Amphibious Corps, 7 Apr. 1944, p.494.

were not equipped with telephones soon enough, with the result that runners had to be sent to the front lines to request corpsmen and stretcher bearers. To overcome the shortage of stretcher bearers, it was felt that the collection section of the medical battalion should be increased to 60 men divided into three teams of 20 men each. It was found that the water brought ashore in tins was about 60 percent unpotable. Recommendation was made that while in camp, the expeditionary cans and drums should be filled with water, to which would be added one ounce of baking soda for every five gallons, and left standing for two weeks; the cans then should be subjected to live steam and refilled with the soda solution.

The aid station doctors and hospital corpsmen were frequently and unnecessarily fatigued and their efficiency impaired because they had to bend over or work in a kneeling position when treating patients laid directly on the ground, and it was recommended that in the first-aid station, a folding stand be devised on which stretchers could be placed.[15]

Majuro

Although the occupation of Kwajalein and Eniwetok Atolls represented the real conclusion of the Marshalls campaign insofar as the Navy Medical Department is concerned, mention must be made of the seizure of Majuro, and the lesser atolls. Speaking generally, there were few, if any, medical problems, other than routine matters.

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15. Distribution of the ComGen, Northern Landing Force, 19 May 1944, pp. 112-119.

Majuro Atoll, which lies in the eastern portion of the Marshalls, is surrounded by a number of islands which, in the initial planning, were to be bypassed by the invading Americans. It is about 24 miles long by 5 miles wide, extending generally east and west, with long stretches of reef on the north and west. Most of the south side of the atoll consists of Majuro Island, which curves snake-like for 21 miles, with an average of 200 to 300 yards, except in the westernmost portion where it broadens considerably. Other important islands in the atoll, all of which are situated in the western portion of the lagoon, are Dalap, Uliga and Darrit. All of the islands have dense vegetation.

Initial landings were effected on 30 January 1944, and it developed that the greatest resistance occurred from the sea itself, which was extremely rough. One Japanese ground officer was found and taken prisoner and a few Japanese families were taken into custody, but there was absolutely no military resistance. On D plus 2 days, units of the fleet began to arrive and on D plus 3 days there were about 30 ships in the anchorage, with others due to arrive in considerable numbers. Work was commenced on the air field on Dalap on 3 February, and on 4 February the commander of the Central Pacific Forces announced that the capture and occupation had been completed, with the island commander, E. A. Cruise, taking over at six o'clock in the morning.

Eniwetok

Because of the early and successful termination of the Kwajalein operation, it was possible to plan the capture of Eniwetok in February. All units sortied from Kwajalein on 15 February. The

passage to Eniwetok was made without incident. In accordance with previous plans, the Japanese were subjected to the usual heavy shelling and bombing and there was no return fire. Silence had been ordered by the Japanese High Command to conceal positions.

The operations in the Eniwetok group were extremely bloody, and the assault on Parry Island could properly be compared to the attack on Betio in the Tarawa Atoll of the Gilberts.

The account by J. M. Johnson, 3rd wave guide officer, as reported in the Action Report of APA 25 on the LCI 442 incident in the assault on Parry Island speaks for itself:

> ... later the coxswain of the third wave guide boat (Brien, Clyde T. 516-678, S1c) called attention to an LCI about 200 yards away that was burning. This was LCI 442. The quarterdeck was burning. The wave guide boat was brought along the starboard side, forward of the deck house, where most of the burning ship's crew and officers were gathered. One member of the crew called out that the magazine was on fire. The third wave guide officer went aboard and went to the upper deck and aft. A Ship's officer was met there and he also stated that the magazine was burning. Upon reaching the after part of the upper deck, the dead and wounded were seen lying about the deck. It was not known to this officer until this time that there were casualties aboard.
>
> Brien, coxswain of the third wave guide boat, had come aboard immediately after seeing that his boat was properly secured and was present when the wounded were discovered. A ship's officer was asked the number of wounded aboard but at this time the exact number was unknown. An investigation was started. The third wave guide officer went aft to the quarterdeck in search of wounded. Brien went below into the deck house finding a man dazed by a shrapnel wound behind the ear. He was placed upon a table in the crew's quarters and Brien went in search of first aid equipment. On the quarterdeck there were several charred bodies lying around the magazine hatch. Investigation showed that no wounded remained in the magazine or on the quarterdeck.

There was much loose ammunition lying about the deck; it was ordered thrown overboard. Two members of the crew were ordered to disconnect the ignition wires from the rocket projectors that were still loaded.

In the after starboard 20 mm gunpit there were several mangled bodies and pieces of flesh and pools of blood about the deck. One man in the gun pit was still alive, with a badly lacerated leg. He was removed from the gunpit and as no first aid equipment was at hand a tourniquet was made from a piece of line and bound above the wound. An officer was ASKED ABOUT FIRST AID EQUIPMENT AND HE STATED THAT THERE WAS NONE ABOARD. The wave guide officer's first aid kit and the boat's first aid bag were brought aboard by the engineer of the wave guide boat (Miller, Billy L. 588-758, Flc). The wounded man was then given morphine.

Another wounded man was lying on the port side of the upper deck with a deep wound in the leg just back of the knee. Blood was spurting from the wound and it was evident that the man was already growing weak from the loss of blood. With the aid of Larsen, Howard E. 575-044 Slc, a tourniquet was applied. This did not stop the flow of blood and a compress was applied directly to the wound. The wounded man was conscious and stated that his leg and toes were in pain and that he was weak. He was given morphine.

Stretchers were needed and after being informed by a ship's officer that none were aboard, Brien was sent to rig something in which to carry the wounded to the boat. Before this was done several Stokes stretchers were found nearby.

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First aid was continued in the boat and a seaman with a deep wound in the arm, who was brought aboard by Larsen, Miller and Dichiara, was given morphine. Miller assisted in comforting the wounded. The hospital ship was notified by radio that a boat with casualties was approaching. They were waiting to receive them and at approximately 1000 all were aboard under the care of doctors, who were informed as to what had been done in the way of first aid. The officer of the Deck of the SOLACE remarked that the USS ARTHUR MIDDLETON would be credited with evacuating the first casualties in the Parry landing.

UPON RETURNING TO THE LCI 442 IT WAS LEARNED FROM AN OFFICER THAT THE SHIP HAD RECEIVED A DIRECT HIT FROM EITHER A CRUISER OR DESTROYER IN THE FIRE SUPPORT GROUP. It was also learned that the charred bodies on the quarterdeck had been burned at the time of the direct hit by an

exploding gasoline drum situated on the quarterdeck. With the aid of another LCI, the fire had been extinguished. 16

One of the difficulties involved in caring for large scale casualties at Eniwetok was the handling of money and other valuables. Recommendations were made that troops and other personnel about to go into a campaign area remain unpaid until the successful completion of the action, and that casualties be stripped on the beach of ammunition, hand grenades, and demolition units before being sent to hospital ships or other vessels. It was also found that the boat crews needed further training in the technique of hoisting litter cases aboard. One suggestion was made-- that the ship's laundries be instructed to accept soiled and bloody clothing stripped from Marine casualties which could be used to clothe Marine ambulatory patients, thereby relieving the necessity of drawing Navy clothing. 17

The USS CUSTER reported that its medical department operated with high efficiency. It was further pointed out that during the height of the battle on Eniwetok, every doctor and pharmacist's mate worked continuously for thirty-six hours. Typical of all ships receiving casualties, the CUSTER utilized its troop officers' mess room on the main deck as a collecting station. It was recommended that improvements in the ventilating system of the sick bay be made. 18

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16. Distribution of CO USS ARTHUR MIDDLETON, 7 Mar. 1944.

17. Distribution of the CO USS HAYWOOD, 18 Mar. 1944.

18. Distribution of the CO USS CUSTER, 29 Mar. 1944, pp. 8, 9, 13, 17, 20, 21.

Some concern was evidenced by various medical officers concerning the loss on the beaches of litters, life jackets and blankets, but no effective solution of this equipment problem was suggested.

The hospital ship, USS SOLACE, arrived at Eniwetok 21 February 1944. The northerly two-thirds of Eniwetok Island had been secured on 20 February. However, during the night of 20-21 February, the Japanese defenders remaining on the other one-third of the Island staged a counterattack. Casualties were admitted from the transports and from the beaches the following morning; these patients were predominately Army and consisted of approximately 30 percent of all the casualties received in this location.

Landings in Parry, adjacent to Eniwetok Island, were effected on 22 February, and the remaining patients from the Eniwetok theatre were evacuated directly from the beach. The reports indicate the absence of cross machine gun fire at Eniwetok, with enemy resistance in the form of sniping and the use of mortars and grenades predominating. There were a number of wounds inflicted by the explosion of land mines and a great many demolition accidents. At this point in the Marshalls operations, the handling of casualties was more efficient and a system of segregating patients was evolved whereby only the most critically wounded individuals were sent to the SOLACE and the less severely wounded persons were treated on board transports. It was noticeable that the bulk of all patients received aboard the SOLACE had been wounded only a few minutes or a few hours prior to admission.

Another vessel which participated in the assault on Eniwetok,

and whose medical experiences could be considered as fairly typical of ships similarly participating, was the APA12, the USS LEONARD WOOD, which arrived off the main island in time to receive its first casualty aboard on D-day, from which time the wounded arrived and were treated continuously. On 21 February 1944, the census of the LEONARD WOOD stood at 70 cases, of which 46 were transferred to the SOLACE. On 25 February, this APA sailed for Roi and transferred all of its patients to the USS RELIEF, which was functioning as a temporary hospital at Kwajalein until a dispensary could be established ashore. At the time of transfer of these wounded persons, it was estimated that some 90 percent would be fit for duty in 30 days. The medical officer of the LEONARD WOOD recommended that the sick bay of this vessel have a separate water circuit and that the water be properly sterilized in order to avert the danger of epidemics or acute infections.[19]

The percent of persons actually killed in the action at Eniwetok was substantially the same as at Tarawa (25 percent).[20]

The chief of the surgical service aboard the SOLACE hastened to point out the necessity for the determination, in a rather arbitrary fashion, of what constituted the primary wound, inasmuch as a number of cases of multiple wounds had been inflicted. The test that was adopted was to determine which would be more likely to endanger the patient's life, and in those cases where no one wound would be likely to be fatal, to classify as primary that wound which would

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19. Distribution of the CO USS LEONARD WOOD, 16 June 1944, pp. 7-14.

20. Study of Battle Casualties Evacuated from Three Amphibious Operations, USS SOLACE (AH5), 28 Apr. 1944, p. 9.

threaten the greatest period of morbidity.

In the treatment of casualties it was necessary to adopt such modifications as were indicated by conditions prevailing aboard the hospital ship. A pertinent example cited was the case of traction in the reduction and immobilization of fractures, where skeletal traction exerted in various directions by means of weights and pulleys was found not to be adaptable because of the motion of the ship, enough clearance between upper and lower bunks, and the possibility of having to abandon ship in an emergency. It was therefore necessary, according to the medical officers, to reduce the fractures through traction obtained by skeletal pins and immobilize the fracture by the use of plaster. Sulfonamides and penicillin were utilized aboard the SOLACE, although the latter was not employed extensively.

An interesting study of mortality statistics was made in considering the amphibious operations at Betio, Kwajalein, and Eniwetok by the USS SOLACE. In the last named operation, the mortality rate was 4.5 percent. Eleven out of the 18 succumbing died within 20 minutes to 12 hours after admission. However, in connection with the receiving of casualties aboard ship at Eniwetok, it must be borne in mind that had conditions similar to those which obtained at Tarawa been present, this figure would have been considerably reduced as the facilities for evacuation at Eniwetok were much more favorable.[21]

The best estimate of casualties on Kwajalein indicated that

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21. Distribution of the CO USS LEONARD WOOD, 16 June 1944, pp. 8-14.

Japanese casualties numbered 8,386, of whom 8,122 were killed in action. The Americans sustained 367 deaths. At Eniwetok, 3,466 Japanese were casualties -- 3,400 of them being killed as compared with 299 American dead. Eniwetok was declared captured on 23 February 1944, which marked the immediate conclusion of the greater Marshall campaign, even though the atolls of Wotje and Malaelap, Mille and Jaluit remained in Japanese hands.

A number of surveys of conditions existing on the various atolls were made subsequent to the military phases of the campaign and the medical officers conducting such studies found that there had been few epidemics on the islands but that yaws and gonorrhea were prevalent among the native population. Apparently there was little history of tuberculosis, leprosy, malaria and filariasis. There was a dearth of medical men, although there were a few natives possessed of some familiarity with simple medical practices.

In the occupation of the various islands, it was found that progress was steady, although marked by confusion, duplication and absence of effort on various projects. For example, on Roi and Namur hot meals were served to all personnel at least once a day from the beginning, and all hands enjoyed excellent health and were possessed of the basic necessities of life. By March 1944, Roi and Namur had progressed from a crude, frontier outpost into a well established and well ordered community, despite the loss of life and destruction of installations and materiel which were suffered when the Japanese made a successful air attack on Roi.

In March 1944, the erection of a 200-bed hospital establishment on Japan Island, accessible to Eniwetok by boat, was planned, with Eniwetok to have a dispensary of about 50 beds, with two medical officers and one dental officer. Two other facilities in Eniwetok were to have dispensaries of 50 beds each. Inspection of this latter island revealed that measures for malaria control for personnel previously under suppression treatment for malaria had been discontinued, but this was corrected immediately and the men were also compelled to use salt tablets. The Army had a 300-bed field hospital on Engebir Island and the Marine Air Corps, a 50-bed dispensary. Dispensaries were set up on Majuro Atoll and measures were instituted to have these facilities enlarged in order that the RELIEF could proceed to other theaters of operation. It was the opinion of the inspecting party that the overall situation, from a medical standpoint, could be considered good in view of difficulties encountered. There were adequate medical facilities and supplies. Continuous vigilance of all personnel with respect to sanitation was necessary at all times. By the end of March, ample air evacuation to Pearl Harbor from this Central Pacific Theater was available.

Summary

In summary, the Navy Medical Department in the Marshalls Campaign put to good use the hard lessons which had been learned on the bloody beaches at Tarawa. At Kwajalein, the handling of casualties did not present any particular problems because of the short-lived Japanese opposition, but at Eniwetok, the energies of both medical officers and hospital corpsmen were sorely taxed. The use of a hospital

ship as a supplementary facility prior to the erection of a shore dispensary was employed to advantage at Kwajalein and this innovation was to be utilized again and again.

THE MARSHALLS

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CHAPTER VIII

THE MARIANAS

The second phase of the great advance moving west from Hawaii was the capture of a group of heavily-wooded, coral-reefed islands, the Marianas. These islands were an integral and vital unit of the Japanese Empire, and an important supply and staging base for their Pacific activities. In the Marianas campaign, Navy medicine was faced with new difficulties and problems, on the solution of which hung much of the success or failure of the coming Pacific campaigns.

The cluster of seventeen islands in the Marianas group, with a total area of approximately 450 square miles, had, with the exception of U. S.-owned Guam, been under the control of the Japanese military as mandates from the League, following the first World War.[1] In December 1941, after a bitter and gallant defense, the American forces on Guam had been forced to surrender. Now, with Tinian and Saipan to the north, it loomed as a formidable barrier to any American advance in the Pacific.

On 1 May 1944, Expeditionary Troops, Task Force 56 was activated under Admiral Spruance's Fifth Fleet and assigned the

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1. Perry F. Allen, ed., Stewart's Handbook of the Pacific Islands, p. 129 .

capture, occupation and defense of Saipan, Tinian, and Guam.[2] This force was divided into two main units, the Northern Troops and Landing Force, Task Group 56.1, organized for the seizure of Saipan and Tinian; and the Southern Troops and Landing Force, Task Group 56.2, committed to the occupation of Guam, 100 miles south of Tinian and Saipan. The 27th and 77th Infantry had been alerted in Hawaii to act as reserves for both forces.

The component units of the task force were to be mounted from Hawaii, the Solomons and the west coast of the United States, and the target date was set as 15 June.[3] Transportation for this operation was furnished by the Fifth Fleet, the largest yet assembled in the Pacific, with control of over 800 ships. Final decisions for the entire operation rested with the Commander Fifth Fleet, whose vessels were to "transport, land, cover and support the landing forces and garrison forces of Task Force 56."[4]

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2. Ernest J. King, Second Official Report to the Secretary of the Navy, p. 13. The over-all commander of Expeditionary Troops, Task Force 56 was Lt. Gen. Holland M. Smith, USMC. The Northern Troops and Landing Force, under Lt. Gen. Smith and later Maj. Gen. Harry Schmidt, included the Second and Fourth Marine Divisions, reinforced, the Twenty-fourth Army Corps Artillery, corps troops and elements of the garrison units - all under the over-all command and staff of the Fifth Amphibious Corps. The Southern Troops and Landing Force, staffed and commanded by the Third Amphibious Corps and led by Maj. Gen. R. S. Geiger, USMC, included the Third Marine Division, reinforced, the First Provisional Marine Brigade, the Third Amphibious Corps Artillery, corps troops, and elements of the Third Amphibious Corps.

3. Action Report, Commander Task Force 56, p. 3.

4. Ibid., pp. 31-33.

Several months before the target date, active preparations were initiated with the purpose of establishing a state of advanced readiness. Over-all training, amphibious training, provisions for supply and logistical support, and provisions for additional personnel swung into motion. Troops in the Hawaiian area to be used in the Marianas assault underwent a realistic dress rehearsal on beaches at Maalaea Bay, Maui, and Kahoalawi.[5] Resulting object lessons were stressed, and personnel given a supervised period of rehabilitation following the rehearsal. Replacements of personnel were needed in the Second and Fourth Marine Divisions, as two accidents caused by unauthorized explosions resulted in 208 casualties.[6]

Navy medical planning for the Marianas operation was thus faced with the problems of caring for a large combat force, for shore based naval units and advance echelons of garrison forces, as well as providing for anticipated civilian casualties, many of whom would be women and children. In addition to combat casualties, medical problems could be anticipated from the presence of such exigencies as hemolytic venomed Moray eels and poisonous coral which inflicted slow-healing cuts.[7] Of necessity, existing medical facilities had to be enlarged and diversified.

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5. Ibid., p. 3.

6. Ibid., p. 230.

7. "Medical and Sanitary Data on Guam", War Department Technical Bulletin, p. 4.

With the Fifth Amphibious Corps, which was destined for Saipan and Tinian, were the Second and Fourth Medical Battalions, component units of the Second and Fourth Marine Divisions. The substantial Fifth Corps Medical Battalion, as adjunct, arrived from the mainland of the United States.[8] The Third Amphibious Corps, looking Guamwards, added additional medical personnel to each of its basic medical units (the Corps Medical Battalion, the Third Medical Battalion, and the two medical companies of the First Provisional Marine Brigade).[9] The augmented facilities of the Third Corps Medical Battalion provided a 750-bed field hospital for its phase of the operation. In reserve in Hawaii, the 77th Army Division, equipped with three field hospitals (the 31st, 36th and 38th), made the 31st available to the Fifth Amphibious Corps.[10]

Special medical training was given during the period of preparation and rehearsal. Units which were to be embarked for the expedition from the Hawaii area received training at Maui in field sanitation, tropical diseases, care and transportation of the wounded, and first aid.[11] Corpsmen were trained with their respective units, and use was made of the lessons learned at Tarawa and Guadalcanal.

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8. Action Report, Com Task Force 56, p. 452.

9. Action Report, Commander III Phib Corps, p. 155.

10. Action Report, Task Force 56, p. 452.

11. Action Report, Commanding General 4th MarDiv, Saipan, p. 465.

Collecting stations were equipped to act initially as battalion aid stations for the efficient handling of anticipated heavey casualties during the landing phase; while hospital sections were put under division control to establish a large division hospital for the care of all the wounded, in the event of the transports' being forced to pull out.[12]

Section 1 Saipan

The key to the Japanese defense of the Marianas was Saipan, where heavy fortifications had been systematically prepared from the time it entered Japanese control in the first World War. From the fall of Guam, the islands had been free of action, but a fast, punishing task force raid in February 1944, under Admiral Mark Mitscher brought the Marianas into the American naval offensive. It was significant that the return fire and air defense of the Japanese during this raid, while substantial, was not as fanatical as that met at Kwajalein and Truk.[13]

Embarkation

On 29 May 1944, the Hawaiian units, formidable in the gun and air power of the protecting war vessels, and heavy with troops and supplies, steamed westward through calm blue waters. Medical companies were dispersed throughout the forces prior to departure, in accordance with a regular pattern based on combat experience.[14] One company of the medical battalion

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12. Action Report, Commanding General 2nd MarDiv, Forrager Expedition, p. 2.
13. O. Jensen, Carrier War, p. 121.
14. Action Report, Com Task Force 56, p. 460.

accompanying each Marine division was attached to each RCT.[15] A third of the collecting section, with litter units, light first-aid material, and a proportionate number of company jeep ambulances, was embarked with each BLT.[16] The remaining sections of the medical company were then embarked on the ship with the RCT headquarters.[17] Each RCT was embarked on three to five APA's; and one or two AKA's carried their supplies. To each medical battalion were attached nine members of the band section. The average medical battalion in the Saipan invastion contained 50 corpsmen, 9 bandsmen, 2 drivers and 2 medical officers.[18] In addition, 27 dental officers, who were attached to the various units participating in the engagement, embarked to act as sanitation officers, anesthetists, evacuation officers, water supply officers, mess officers, and company mail censors and to serve in regimental and battalion aid stations.[19] Red Cross personnel, although assigned to Marine regiments, were not embarked for combat operations.

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15. The RCT or Regimental Combat Team constitutes one third of a Marine division, and is the formation used in amphibious assault.
16. The BLT or Battalion Landing Team constitutes one third of the RCT, and is the basic assault unit of the amphibious team.
17. Action Report, Com Task Force 56, p. 460.
18. Action Report, ComGen 4th MarDiv, Saipan, p. 465.
19. Action Report, Com Task Force 56, p. 469

In embarking large numbers of troops for an operation of this size where heavy casualties were to be expected, one of the most important problems was that of medical supply. Three new departures in medical supply handling, based upon experiences of previous campaigns, were adopted at the outset. Supplies desired by battalion and regimental corpsmen for immediate use were packed in waterproof carrying cases, each load containing those items found by past experience to be most needed in administering primary treatment. In contrast, heavy units including surgical tables, dental units, sterilizers and spot lights were left in the rear echelon. Combat-loaded jeeps containing replacement supplies for medical sea bags, along with extra plasma and litters, were to provide prompt beach resupply.

A second innovation was the packaging of 50 percent of the remaining bulk supplies necessary for 30 days in a replacement unit which contained three boxes, each weighing fifty pounds. Battle dressings, sulfa drugs, and morphine syrettes made up the first; the second contained plasma; and the third, termed the utility box, included miscellaneous drugs and supplies for sick bay.

A third supply feature was the provision of two LVT's for medical resupply, each to be known as the Mobile Dump, one for each of the Saipan beaches.[20] Resupply to supplement the

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20. Action Report, ComGen 2nd MarDiv, Forrager, p. 2.

supplies embarked, was to come from the Sixth Base Depot.

It is interesting to note that a number of item lacking in the Marshalls campaign were included among the supplies embarked for the Marianas--intestinal clamps, atraumatic catgut, tracheotomy tubes, oxygen, and several dozen hemostats. Useful also was to be a large supply of "Band-aids" contributed by the American Red Cross.[21]

Although medical supply provision for civilian use had been recommended, it was disapproved by a higher echelon; thus no medical supplies, tents, cots, or equipment for civilians were embarked.

Reports on the health conditions among troops carried by the transports varied. The Second Marine Division stated: "The health of the command at the time of this operation was excellent, even though there were 4,532 known cases of malaria who had had one or more up to ten recurrences."[22] An effort had been made, however, to weed out the unfit before the campaign, and in February, 546 had been eliminated from the Second Marine Division as unsuitable for combat. Three weeks previous to the embarkation all troops were put on an atabrine suppressive therapy, and this was continued throughout the voyage. One month prior to embarka-

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21. Action Report, ComGen 4th MarDiv, Saipan, p. 195.

22. Action Report, ComGen 2nd MarDiv, Forrager, Sec. VI, p. 1.

tion, tetanus boosters were administered to officers and men. Hitherto this had been carried out aboard ship, but in the Saipan operation it was done in camp, with better coverage of all personnel.

Measures instituted aboard ship to maintain the troops in fighting condition met with limited success, as over ninety percent of the troops of the Fourth Marine Division had diarrhea at one time or another, varying from mild to severe cases. Attempts were made to control this ailment by placing five percent creosol solution for hand rinsing in wash rooms aboard ships, and by utilizing a series of G. I. cans for washing canteen cups, with steam piped for the final rinse.[23]

Another sanitation problem aboard ship was the presence of numerous bedbugs. The commander of one vessel reported that all available means were tried to rid the troop compartments of the vermin, but while they would be retarded for an interval, after a short period they reappeared in greater numbers than before. Bad overcrowding on APA's added to sanitation difficulties, and there was general criticism of poor ventilation and air conditioning, which caused temperatures frequently to reach 100° F. on transports.[24] Improper laundry facilities on board troopships caused many complaints; fungus infections thrived in varying degrees

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23. Action Report, USS PIERCE, Saipan, p. 11.

24. Action Report, ComGen 4th MarDiv, Saipan, p. 166.

of severity. Because of the employment of inexperienced men for collecting, marking, and distributing, a large percentage of clothing was lost.

Another irksome factor in the general health and sanitation of embarked troops was the absence of sufficient variety of foods, and the lack of fresh fruits and vegetables.[25] This shortage continued throughout all the Pacific campaigns with little remedy. Frequent recommendations were made by medical officers that canned fruit juices and fruits be made more plentiful in the diet, but no action was taken to correct this deficiency.

Shore Phase: Debarkation and Assault

The troop movement from the staging areas at Eniwetok and Kwajalein commenced on the morning of 11 June, D minus 4, and the afternoon of that same day Task Force 56 released a pounding carrier and surface fire on Saipan, Tinian, Guam, Rota and Pagan Islands. Destroyers kept up harassing bombardment on Tinian and Saipan throughout the night. On D minus 1, underwater demolition teams and mine sweepers went into successful action near Saipan, and on the morning of 15 June (D-day), at 0830, the grey LVT's, carrying their assault troops, moved toward the beaches from a reef which blocked the closer approach of the larger ships to Saipan. Leading the way was a wave of armored amphibians firing 75mm howitzers and 37mm guns.[26]

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25. Ibid., p. 473.

26. Action Report, Com Task Force 56, p. 39.

Vicious artillery and mortar fire from carefully hidden Japanese positions increased in volume as the second and third wave hit the beach. The fight for the beachhead was the most critical stage of the battle for Saipan, and boatload after boatload of Marines fell under a relentless enemy barrage.

The battalion medical sections hit the beaches with the fourth wave of LVT's. Under the medical plan of operation the collecting sections were to arrive in the last wave of boats bringing in the reserve battalions, which would put them ashore some ninety minutes after H-hour.[27] But the collecting sections were not the first medical men to go ashore; accompanying every fighting platoon had gone company aid men carrying their vital seabags of medical supplies. Long before the battalion aid stations were set up, while assault and debarkation were still in progress, the injured on the beaches received first aid.

Beach Treatment and Care of Casualties

During the early phases of the assault at Saipan, the scene of sand, blood, and wreckage was intensified by an atmosphere of "extreme confusion."[28] Seabees, Marine shore party detachments, and naval beach party personnel had dug into fox holes over the entire area above the high water mark, and the proximity of the enemy, along with the continuous shelling of the beaches, strained

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27. Action Report, ComGen 2nd MarDiv, Saipan, p. 2.

28. Action Report, Commander Task Units 52.34 and 52.92, Saipan, p. 15.

the nerves of the officers and men. Ammunition cases were broken open, and the contents strewn about among the thousands of lifebelts that littered the beaches and floated uneasily on the water. The dead, both Japanese and American, had been hastily collected to await trucks for transportation to a burial ground. Not until D plus 3 with the arrival of the Army shore party commander did the beaches operate entirely according to plan.[29]

Into this melee of battle, Navy medical units were hastily landed by the LVT's and LCT's. The first groups to establish medical order were the Navy medical sections of the beach parties, component medical units of the shore party team medical section. These medical beach parties were composed of one medical officer and eight hospital corpsmen from each troop carrier, and they constituted the link between medical care afloat and medical care ashore.[30] They were designated by blue helmets with red crosses painted on front, back and sides.[31] The medical beach parties worked in highly exposed positions on Saipan, sometimes for over 48 hours without rest. Strafing Japanese planes added to the hazards under which the corpsmen and doctors labored as they gave emergency medical treatment and set up rough

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29. Ibid., p. 11.

30. Inasmuch as one BLT is embarked on one APA, one beach party medical section is available for each BLT. Training Guide for Amphibious Medicine, p. 15.

31. Ibid., p. 35.

casualty evacuation stations in the trampled sand.

The shore party medical sections were composed chiefly of Marine and Army personnel (Navy medical personnel served in Marine uniform when attached to Marine divisions). At Saipan they numbered four sections to each Marine division, one medical officer and six hospital corpsmen to each section.[32] Initially, the shore party medical establishments served as collecting and evacuation points. In the latter phase of the operation, shore party medical personnel became reinforcements to the division hospital staff.[33]

Another important part of the medical establishment to be found on the Saipan beaches was the battalion aid station. During the long hours when the invasion forces were confined to the beaches, these units, which acted as forward emergency and evacuation centers, were forced to set up their facilities on the beaches. From these stations the company aid men went out to minister to the wounded--to stop hemorrhages, apply sulfa drugs, dressings, splints, to administer morphine, to make out emergency medical tags, and carry the wounded to the boats.

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32. Action Report, ComGen 2nd MarDiv, Saipan, p. 5.

33. Ibid. This was possible because later evacuation was made direct from the division hospital via DUKW's, which eliminated the necessity for an evacuation party at the beaches. The shore party at Saipan did establish an evacuation station on D minus 4, which was used until the setting up of the division hospital.

Heavy fire, exploding mortars, artillery shells, and snipers' bullets made the functioning of separate medical groups on the beaches difficult. Often they were merged in the immediate necessity of caring for the wounded and getting them off the beaches. Separately functioning units could not be set up until a beachhead was established. Despite the disordered conditions prevailing on the beaches, no report of the Saipan action had anything but praise for the doctors, corpsmen, and other medical personnel who performed their individual duties with little or no thought for their personal safety.[34]

Casualties during the first five days of the operation were very heavy, and the beach medical facilities were constantly overcrowded and undermanned. One shore party evacuation station treated and evacuated 1,009 casualties from D-day to D plus 3 under the most difficult conditions.[35] Jeep ambulances with their loads of wounded were hit time and again by artillery fire. No provision had been made for a movable light-proof shelter

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34. That this was not paralleled by other units in the campaign is evidenced by a statement of a task unit commander describing the Saipan beaches: "Lack of initiative on the part of the officers, CPO's, and lack of interest on the part of the officers and men was obvious. Almost without exception the officers could be located in their foxholes unless individually routed out and put to work. This is attributed to the fact that the officers and men were untrained in this type of work and were out of their field, and also to the fact that they were under fire constantly for almost thirty hours and were fatigued." Action Report, ComTaskUnits 52.34 and 51.92, Saipan, p. 16.

35. Action Report, ComGen 4th MarDiv, p. 196.

in which the wounded would receive adequate treatment on the beach during the long night hours. The maintenance of a strict blackout was essential, and yet it was almost impossible to diagnose and treat a wounded man in the dark by the pale gleam of a poncho-covered flashlights.[36] Still another hazard confronting the Medical Department was the landing of ammunition and gasoline on crowded beaches in proximity to casualty evacuation centers.[37]

An important aspect of medical activity on the beaches was the functioning of medical supply in the early hours of the engagement. Corpsmen carried primary supplies in seabags. Jeep ambulances which had been combat-loaded were debarked fairly successfully during the first few days. In some instances, however, deck officers mistakenly ordered ambulances unloaded prior to debarkation of troops. Severe temporary shortages resulted from this.[38]

Shortages of litters, tetanus anti-toxin (for treatment of natives and prisoners of war), blankets, blackout tents, and penicillin were the most notable on Saipan. Litters were in constant demand, and there were frequent complaints that the ships were not sending enough of them to the beaches. Fifty more litters per troop transport were recommended by the senior medical

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36. Ibid., p. 512.

37. Action Report, USS BOLIVAR, 27 June 1944, p. 10.

38. Ibid., p. 198.

officer for future engagements, where landing force evacuation lines were as long, and casualties as heavy as at Saipan.[39] Breakage and spoilage of litters in burial of the dead was another factor in the shortage.

Despite inadequacies in certain items, medical supply and resupply functioned fairly competently on the Saipan beaches. There were sufficient plasma, battle dressings and splints to meet the needs. After the initial assault was over and the medical organization could be set up on the beaches, the regimental aid station supplied the battalions, while the regimental station itself was supplied by the medical battalion of each Marine division. Each evening, efforts were made to supply the battalions with the necessary equipment for the anticipated casualties of the following day.

Medical beach treatment, on the whole, reflected favorably on the Navy medical units. The hospital corpsmen of the collecting units exposed themselves constantly to enemy fire in order to reach the wounded, and their bravery is partially reflected in the heavy casualties among their numbers. The corpsmen acted independently of the doctors to meet emergency medical situations, and it was recommended after the operation that an increase in rates be allowed the medical beach parties.

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39. Action Report, Commander Joint Expeditionary Force Marianas, Enclosure K, p. 254.

Training in primary first aid with emphasis on the use of plasma and whole-blood transfusions at early stages saved the lives of many whose names might otherwise have been added to the lists of "Died of Wounds Received in Action."

Evacuation

In the first days of beach fighting, with the difficulty of maintaining organization under murderous enemy fire, the most important factor in the over-all saving of lives is to get the wounded off the beaches to the ships where they can receive necessary and definitive treatment as promptly as possible. It has been said that the first six hours are the most important in the treatment of a wound. With this in mind the need for quick, competent evacuation cannot be over-emphasized.

The experience gained in previous campaigns, as well as much thought, went into the plans for evacuation of casualties at Saipan. In addition to the general problems of evacuation experienced in earlier Pacific Island campaigns, there were a number of other specific complications. The presence of coral reefs, the loss of many small boats during the assault phase (thus decreasing the number of boats available for evacuation), the difficulties of evacuating against a constant flow of troops and supplies, the need for medical care among evacuees, and the pressure of combat on the beach itself--all served to derange organization.

The general evacuation plan provided for the reception of initial casualties aboard the APA's, to which they were brought by landing craft and amphibious vessels. From D plus 3 on, the hospital ships were to arrive at regular intervals to remove the casualties to the Marshalls and from there by air to Pearl Harbor. The presence of jutting coral reefs made it necessary to bring the wounded to the reefs in amphibian tractors (LVT's) or amphibian trucks (DUKW's), and then transfer them to LCVP's. Three LST's, medically and surgically equipped, were also designated to stand off the reefs to receive casualties from the amphibious tractors and trucks.[40]

During the first week at Saipan all casualties, including seriously wounded civilians and prisoners of war, were evacuated to ships of the force. A division of APA's was employed to retain the less serious casualties within the area until they were able to be returned to hospital facilities ashore or directly to duty. The most critical period in evacuation was from D plus 11 to the time the island was secured. With the withdrawal of the transports on D plus 11, insufficient vessels and medical personnel were left to care for the streams of wounded averaging five hundred per day, exclusive of the increasing

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40. Action Report, Headquarters Expeditionary Troops, Task Force 56, Marianas, p. 456.

numbers taken sick with dengue, catarrhal fever, and dysentery.[41]

Starting on D plus 9, air evacuation was instituted from Saipan. A total of 860 casualties were evacuated to the Marshalls, but with poor medical results. No flight surgeons had been provided to sort the patients to determine which were fit for air evacuation; no medical attendants had been provided to accompany the patients. As a result, a number of casualties, unable to stand the rigours of air transport, died en route. In some cases patients who had been in combat with little or no food for over 24 hours were evacuated by air without being fed.[42]

At Kwajalein and Eniwetok inadequate preparation had been made to care for the air evacuees from Saipan. No screening was performed during the three to four days' wait for further air evacuation to Pearl Harbor.

The most serious evacuation problems, however, and those affecting the greatest numbers of casualties, were associated with sea evacuation. A major cause of difficulty was the coral reef which made necessary the retransfer of casualties resulting in delay, injury, and discomfort for the wounded. Occasionally as many as five transfers were necessary--beach to LVT, LVT to LCVP, LCVP to LST, LST to APA, and APA to hospital ship.[43]

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41. Action Report, Com Joint Expedit. Force, p. 253.

42. Letter from Adm. W. Chambers to Vice Adm. Ross T McIntire, 10 July 1944, n. p.

43. Action Report, USS SUMPTER, Saipan, p. 14.

The LVT's, which were slow, difficult to handle, and noisy, proved far less desirable than the DUKW's for reef evacuation. The DUKW accommodated six litter casualties, and rode far more comfortably than the LVT. The most effective evacuation ship, the LCVP, could not be taken directly to the beaches of Saipan because of the reef. Occasionally, in the first days of the attack, evacuation was accomplished directly to APA's or hospital ships by use of LVT's and DUKW's. In the latter days of the fighting and after the establishment of hospitals on land, vessels were sometimes used in direct evacuation; but throughout most of the operation numerous painful transfers were required.

The transfer of patients from vehicle to vehicle was complicated by methods employed. When facilities were available, casualties were transferred on Stokes stretchers to APA's by means of a boom.[44] Frequently, however, Stokes stretchers were not available. The most notable absence of proper equipment for transfer was found aboard the hospital ships. These ships, which received boatload after boatload of injured from LCVP's, were not furnished with Welin davits with which to lift the boats to deck level, and the transfers had to be made over the ships' gangways. Boats loaded with wounded gathered off the gangways of the hospital ships where they were obliged to stand for hours in the hot sun with their unprotected loads. Following this

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44. Ibid., p. 16.

operation, official recommendations were made for equipping AH's with better facilities for the transfer of patients, but even the newest hospital ships present at Saipan carried no transfer equipment.[45]

Perhaps the most unsatisfactory feature of sea evacuation was the lack of effective coodination and regulation of the evacuating ships. Great inequalities in apportioning casualties among ships were noticeable. The result was the overcrowding of the medical facilities of some vessels, while those aboard others were only partially used or not used at all. Many ships failed to fly the Mike flag to indicate that they could take casualties. Some boats carrying casualties made stops en route for purposes other than the delivery of casualties.[46] Again and again coxswains would automatically head for the nearest ship to get rid of the casualties as quickly as possible. The report of Lt. (jg) Busse of the USS FREDERICK FUNSTON provides an account of evacuation difficulties:

> After having led the third assault wave as far as the reef on Green Beach One, I picked up four seriously wounded men, three from an LVT which had been knocked out just seaward of the reef, and one out of the water. I spent the next hour trying to find a hospital LST and never did. I finally came alongside an LST which did have a doctor aboard, 3 miles to seaward of the line of departure and put my casualties aboard her. Since the Jap shellfire never did

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45. Letter, ComTransDiv 34, Marianas, p. 3.

46. Action Report, ComTransDiv 32, Saipan, pp. 7-8.

> come out more than 2,000 or 3,000 yards to seaward of the reef there was no good reason why a hospital LST could not have been stationed 500 yards to seaward of the line of departure. As a matter of fact the LST 450 which I was on, and a designated hospital ship could have stayed in the same position she was when she discharged her assault LVT wave, instead of standing out for several hours.[47]

The absence of the hospital LST's was not in accordance with the medical plan. Three had been provided and fitted out for evacuation and temporary care of the wounded. They were to function until the beaches were safe enough for the transports to come in and receive the wounded.[48] However, when most needed - on D-day - there was no sign of the LST's, and they did not arrive until the transports closed to the beach, at which period it was more feasible to evacuate casualties directly to the transports.[49] In addition, the transports which provided doctors and corpsmen for the hospital LST's were left shorthanded themselves to meet the heavy casualty loads.

The value of hospital-equipped LST's should not be underestimated. They could, and in later campaigns did, serve a particular need as casualty collecting stations which could not be provided until later by other facilities. The inadequate performance of their basic function at Saipan, however, was recognized by over-all commands, and recommendations were made

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47. Action Report, Com USS FREDERICK FUNSTON, Saipan, Enc. A, p. 13.
48. Action Report, Com Group 2, Amphibious Forces, p. 80.
49. Action Report, ComTransDiv 7, Saipan, p. 31.

to improve their service. It was recommended that they fly Victor flags to distinguish them from other LST's; that they carry identifying lights at night; that they be supplied with medical personnel of their own so that the transports need not be decimated; that an area be set aside where they could readily be found by boats from the beach; that the number of hospital LST's be augmented where heavy casualties were to be expected; and that a central radio communication control and centralized administration of all the evacuation ships be established.

The lack of communication facilities and centralized control was the real cause of the confusion in the evacuation process. A control boat had been provided for in the campaign, but no communication existed between it and the beach medical section.[50] Arrangements had been made to provide a medical officer of lieutenant commander's rank in the control boat to direct both logistical control of medical supplies and the flow of casualties to the ships, but for unspecified reasons this plan was abandoned.

As the battle for Saipan progressed, and with the extension of lines of communication into the interior, the need for land evacuation vehicles became increasingly apparent. Too few ambulance jeeps had been provided, only one ambulance jeep being primarily available for each medical battalion. When casualties were heaviest a few other jeeps were obtained through

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50. Action Report, USS ARTHUR MIDDLETON, Saipan, p. 67.

requistion of the medical company, but this was a slow process, and frequently the requested jeeps were lost on the way.[51]

An important problem in evacuation during the early phase was that of segregating slightly wounded and those who would be ready for duty in 30 days or less from the more seriously wounded. Sorting was extremely difficult on the beaches where hundreds of wounded arrived at one time and clogged transportation. Dust and mud vied with the enemy fire to frustrate attempts at system and order.

Evacuation of the wounded at Saipan, then, functioned under considerable difficulties, and left much to be desired. More effective medical planning for evacuation of wounded in terms of the specific campaign was indicated. The size of the problem was shown by the fact that 9,546 casualties were evacuated from Saipan by sea.[52] It is significant that official reports recognized the need for improvement in the system and made specific recommendations to this effect.

Treatment in Field Hospital Facilities

Hospital facilities at Saipan functioned very well in view of the heavy casualty rate. The Fifth Amphibious Corps,

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51. Action Report, ComGen 4th MarDiv, Saipan, p. 512.

52. Total evacuation figures for the Marianas operation as a whole appear in Appendix A.

with three medical companies, used two of them to set up a convalescent camp which had begun to function towards the end of the campaign. It was chiefly useful in receiving casualties from Tinian.[53] The third medical company took over a small field hospital at Charon Kanoa, in a captured Japanese hospital. The Charon Kanoa facility was first operated on D plus 2 by a medical company from the Second Medical Battalion. The Second Marine Division hospital started to treat casualties on D plus 8 in buildings of the main Japanese radio station.

The Charon Kanoa hospital was, in the early days of operation, the only facility on the Island capable of practicing definitive surgery. The 97th Portable Surgical Team joined the Charon Kanoa hospital facility shortly after its establishment. No records were available for the first two days, but from D plus 3 through D plus 11, a total of 398 were admitted from the 2nd and 4th Marine Divisions and the 27th Army Division.[54]

The best hospital facilities at Saipan were those of the Second Marine Division. They were located in the former radio building which had been constructed of steel and concrete and were surrounded by ten-foot revetments. With the assistance of a company of Seabees the rubble and damaged radio machinery were rapidly cleared out, and a hospital of 1,000 beds set up. Casualties

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53. Action Report, Com Task Force 56, p. 462.

54. Action Report, 2nd MarDiv, Saipan, p. 5.

with minor wounds were housed in nearby tents. Despite rapid expansion, serious delays in casualty handling did not occur at any time. Eight asceptic operating tables functioned in the four surgical huts which were manned by specialized surgical teams for orthopedics, chest and abdominal, and head and eye injuries. Eleven other tables were available for use in treating shock, administering transfusions and caring for minor debridements, dressings and castings. A major cause of the excellent functioning of this hospital was the strong centralized organization of the medical battalion.[55]

The Second Marine Division Hospital up to D plus 35 had a total admission list of 5,156. Of these 3,408 were discharged to duty during that period, 1,372 were evacuated and 71 died. A mortality rate of 28 percent prevailed in cases of abdominal surgery performed in the Division hospital.

Security from enemy attack was a necessary factor in the setting up of the field hospitals. Japanese infiltration had been responsible for many deaths in previous campaigns, and the rugged terrain at Saipan offered ample opportunity for the enemy to hide out behind American lines. Under these conditions no medical installation could be set up away from troop areas without provision for heavy guard. All hospitals were furnished

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55. Ibid., p. 6.

guards and security patrols. In addition, it was necessary to have the slightly wounded keep their weapons and ammunition and be organized for defense of each unit or building. Where necessary, foxholes and dugouts for patients were provided by hospital company personnel.[56]

Hospital care ashore for combat fatigue cases was provided from D plus 4 on, with the use of two medical companies to treat fatigue, minor injuries and medical cases. There was no real segregation of combat fatigue from other casualties in the early days of the fighting, and those having combat fatigue were evacuated to the transports and hospital ships along with the seriously wounded. Over 500 were later returned to shore and to the special medical companies for physical checkup and re-equipment prior to return to combat.[57] No figures appeared in the reports giving the total number of combat fatigue cases, nor was there information on the percentage of recuperation after Saipan.

The supply system for the field hospital facilities functioned on the basis of a thirty-day medical supply plan. Medical supplies were packaged in blocks, each of which contained a 30-day supply for 3,000 men, and, in addition, individual supplies were reasonably adequate.[58] Some items, such as the Wagensteen

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56. Action Report, ComGen 4th MarDiv, Saipan, p. 197.

57. Ibid.

58. Appendix B gives the contents of the medical unit.

suction apparatus, intestinal clamps (in sufficient numbers), airways, and oxygen apparatus, were not included in the block packaging of medical supplies, and recommendations were made for their inclusion in later campaigns. Especially commended were the portable plywood operating rooms, easily blacked out, and providing clean, weatherproof, insect-free rooms for surgical purposes. As a result of their successful utilization in the Saipan campaign, it was recommended that in future operations two be carried with each platoon of a corps hospital instead of one.[59] The major portion of captured Japanese medical supplies was set aside for care of civilians.

Casualty Statistics

Heavy casualties had been anticipated, but the final figures surpassed the most pessimistic predictions. The total number killed in action was 3,100; wounded in action, 13,099; missing in action, 326-- a grand total of 16,525 casualties, approximately an entire Marine division.[60] Of this number, casualties in the Second Marine Division were 1,150 killed in action, 4,914 wounded in action, and 106 missing in action--a total of 6,170. The Fourth Marine Division sustained 966 killed in action, 5,505 wounded in action, and 141 missing in action--a total of 6,612. Army casualties of the 27 Infantry Division totaled 3,566,

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59. Action Report, Com Task Force 56, p. 468.

60. Action Report, Hqs. Expedit. Troops, TF 56, Marianas, p. 473.

with 959 killed in action, 2,532 wounded in action, and 75 missing in action. In the Fifth Amphibious Corps Artillery, 7 were killed in action and 18 wounded in action--a total of 25. Fifth Amphibious Corps troops numbered 18 killed in action, 130 wounded in action, and 4 missing in action--a total of 152.

Casualties among medical personnel were proportionately heavy, and in many instances resulted from their being unable to utilize protection and cover from enemy fire. In the Fourth Marine Division, 161 doctors and hospital corpsmen were battle casualties while another 157 were admitted to hospital facilities as a result of dengue, dysentery, fungus infection, combat fatigue, psychoneurosis, and other diseases.[61]

Diseases, illness, and combat fatigue accounted for slightly less than one-third as many admissions to medical treatment as did battle casualties. In the Fourth Marine Division, for example, there were 409 cases of dengue fever, 680 cases of dysentery, 26 cases of fungus infection, 414 cases of combat fatigue, 169 cases of psychoneurosis, and 879 admissions from other sickness--a total of 2,577. Not all of these, of course, were put out of action by illness, for in the process of treating thousands of wounded, only men with severe cases of dysentery, dengue and fungus infections were hospitalized.

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61. Action Report, ComGen 4th MarDiv, Saipan, p. 202.

A new casualty reporting system was put into effect at Saipan, and worked with considerable success.[62]

Burial of the Dead

Medical personnel in battle are faced not only with the problem of the care of the wounded and sick, but also with the disposal of the dead for the protection of the living. At Saipan, American and enemy dead were strewn about the beaches and over the rugged inland terrain by the thousands; and despite careful planning, existing facilities for disposing of the dead were unable to keep up with the rate of the fallen. Burial parties had been set up before the attack and had been trained and equipped prior to embarkation. While under the general supervision of the medical department, they were composed of line personnel; and each battalion and H & S company had a burial officer with a detail of men.

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62. Ibid., p.59.

Three by five cards with the following information provided a swift means of report for overworked corpsmen:

(Surname) (First Name) (Middle Name) (Rank)

(Organization) (Serial Number)

(Date and Place of Casualty)

(Date and Place of Burial)

(Plot) (Row) (Number) Evacuated to: Date

KIA W&E WNE
SK&E MIA

Two copies of the cards were made out on every Marine prior to action and this system proved effective in the battalion aid stations and hospitals.

During the early beach fighting, bodies were gathered and given temporary burial while the action was continuing. Those who died during evacuation to ships were generally returned to shore for burial; however, some ships accepted bodies along with the wounded, and their logs shortly thereafter would carry the laconic report, "1730 Held burial at sea on nine casualties."

Enemy dead were buried in common graves, but due to the press of battle there was often a delay of several days before this could be accomplished. Limited quantities of solutions of sodium arsenite and oil were available for spraying, and this aided in fly control.[63] As the American forces advanced into Saipan, the Marine dead were brought to roads by the battalion and company teams and there picked up by the division burial officer and buried in division cemeteries. A service for registration of graves was established prior to the campaign and it functioned reasonably well under arduous conditions.

Despite a generally successful program, difficulties in the burial plan did present themselves at Saipan. Often identification tags were not worn, so that identification of the dead was made difficult. During the beach phase of the campaign, before the burial teams could organize, there was no responsibility

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63. Ibid., p. 197.

assumed by other groups, and there were delays in buring both American and enemy dead. It was recommended that in future operations, the responsibility for burial during the early phase be given to the shore party.[64] During the entire battle the shortage of stretchers and of transportation facilities for the bodies presented difficulties. It was a hard task to persuade units which had carried in ammunition, rations and water to carry back loads of dead. The lack of proper communication between the battalion burial parties and the division burial officers was another difficulty.

Disposal of the dead was, on the whole, effective from a medical standpoint, as bodies were either sprayed or buried within a reasonable time and no large sanitation problem arose from their neglect.

The Battle Afloat

While the battle raged on land, the ships manouvering off shore formed a part of the medical plan as well. APA's, AKA's and hospital ships were an intrinsic part of the evacuation plan and also of the plan of medical treatment. The floating facilities were, until the establishment of the field hospitals, the only locations for definitive treatment of the wounded.

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64. Action Report, USS SUMPTER, p. 15.

The APA's bore the brunt of the initial casualty loads at Saipan, and by the evening of D plus 2 they had taken aboard 3,600 wounded. The hospital ships did not arrive until D plus 3. About this time the transports left the area and, had all the hospital ships in the Pacific been at Saipan, they could not have handled the loads of wounded carried out by the evacuation boats.[65] Despite the fact that the primary function of APA's and AKA's is the transportation and landing of combat troops, equipment, and supplies, the medical services they performed in the Saipan campaign were professionally admirable in view of the conditions under which many were forced to work.

The action report of the USS CAVALIER (APA37) gives a good account of the casualty handling by APA's at Saipan. The CAVALIER's normal complement of 4 medical officers, 1 dental officer, and 20 hospital corpsmen was supplemented before the engagement by 2 naval medical officers and 10 corpsmen. Its 30-bed sick bay area was expanded (by conversion of the troop officer quarters, troop quarters below deck, and ship's officer quarters on the main deck) to the reception of 150 bed casualties and 325 ambulant casualties. Medical supply for the anticipated casualties was enlarged, surgical dressings and plaster of Paris bandages were prepared and arrangements for a pool of men for blood transfusions made. All divisions received instruction in

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65. Action Report, Com TF 56, p. 456.

first aid and casualty handling from the medical department before sailing, and medical teams were formed to facilitate handling.

The CAVALIER received 108 casualties in two days and among these there were only two deaths. Thirty-five men were critically wounded and required surgery; about 40 were ambulant or semi-ambulant. At no time was there lack of proper medical care of the wounded, and even the bunking and feeding were conducted in a commendable fashion.[66]

The USS PIERCE (APA50) experienced difficulties in handling great numbers of casualties at one time because of a lack of proper control over the evacuating ships.[67] The PIERCE had developed an improvement on the transfer of patients from the boats to her deck by keeping an LCV(P) on davits at her rail.

One general criticism of the treatment of wounded aboard the APA's at Saipan was the lack of adequate supplies of penicillin for treating certain wounds. A vigorous attack on shore establishments, presumably responsible for this shortage of a vital drug, was made in the action report of the commander of Transport Group A.[68] This roused an investigation of the situation by the Bureau of Medicine and Surgery and by the staff

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66. Action Report, USS CAVALIER.

67. Action Report, USS PIERCE, Saipan, p. 12.

68. Action Report, Commander Transport Group A, Saipan, p. 31.

of Admiral King; the final onus of the incident was placed on poor logistic organization. "If the supply of penicillin had been handled as an urgent item of logistic planning, a timely and adequate delivery could have been made in this case," concluded Admiral King in his report.[69]

The transports performed a creditable over-all job at Saipan, however, and their facilities were a haven of comfort to the wounded. Captain F. R. Hook, while engaged in an inspection tour of the South Pacific, wrote Admiral McIntire: "I was at Espiritu Santo the day the APA's returned with their casualties (from the Marianas) and had the opportunity of going aboard them and inspecting their facilities for handling patients. They are very well set up for such work, better in fact than our APH."[70]

The hospital ships SOLACE, BOUNTIFUL, and RELIEF treated and evacuated casualties from Saipan after D plus 3. For the majority of casualties these AH's were the medical agency which most frequently performed definitive treatment. After the division hospitals had been set up, the proportion of cases which had received only emergency treatment prior to embarking slackened; but in some instances evacuation continued without clearance through the hospital centers. In many cases definitive treatment was postponed on the AH's until the patient could be brought to larger

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69. Letter from Admiral King to the Vice Chief of Naval Operations, 6 Jan. 1945. f.

70. Letter from Capt. F. R. Hook to Vice Adm. Ross T McIntire, 23 Aug. 1944. n.p.

land hospitals; but traumatic aneurysms, fractures, and perforating wounds of the abdomen always received definitive care.

Staffing and equipment aboard the hospital ships varied with the size and age of the ship. The RELIEF carried a complement of 44 officers, 11 nurses and 434 enlisted men. In the Pacific campaigns, the SOLACE averaged 17 medical officers, 2 dental officers, 3 Hospital Corps officers, 13 nurses, and 173 enlisted men. During the Saipan campaign dental officers participated actively on the hospital ships and were especially useful in giving anesthetics, wiring fractured jaws, and making prosthetic appliances for those patients with perforating wounds of the hard palate.[71] Surgical equipment in the hospital ships was adequate, but one general complaint stressed the definite need of air conditioning. "The most urgent need is for air-conditioning", wrote the captain of the USS SOLACE. "Working as we have done in the tropics, the heat and humidity of the operating rooms is debilitating to the patients and reduces the efficiency of the personnel. Furthermore, it is difficult to maintain good asceptic technique."[72]

The AH's at Saipan were a necessary and integral part of the military campaign, but with the high rate of casualties there was a need for more of these floating hospitals to care for the

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71. Historical Supplement to Annual Sanitary Report, USS RELIEF, 1944, p. 12.

72. Annual Sanitary Report, USS SOLACE, 1944, p. 12.

wounded. Following the campaign, an increase in the number of AH's was recommended and it was especially emphasized that there should be sufficient hospital ships to permit one or more to remain in the area to care for the sick and slightly wounded until they could be returned to duty, rather than to use the AH's solely as evacuation hospitals.[73]

While doctors and corpsmen on the beaches and aboard the transports and hospital ships off Saipan were striving to alleviate suffering and save lives, other doctors and corpsmen aboard the fighting ships--the battleships, carriers, cruisers and destroyers--were trying to cope with the casualties inflicted upon the fleet by Japanese shore shelling and aerial bombardment.

As in other engagements, a systematic first-aid program was instituted aboard the fighting ships for all non-medical personnel. When the USS CALIFORNIA suffered a heavy explosion off Saipan, its doctors and surgeons commented very favorably on the excellent condition of casualties brought to the collecting stations by the ship's company.[74] The carrier, USS BUNKER HILL, showered with bomb fragments from a near-miss by an enemy dive bomber, reported efficient first aid by the ship's crew as well as by the medical staff.

Medical facilities aboard carriers off Saipan included

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73. Action Report, Hqs Expedit. Troops TF 56, Marianas, p. 457.
74. Action Report, USS CALIFORNIA, Saipan, p. 50.

approximately twelve battle-dressing and first-aid stations on each ship. The BUNKER HILL had three on the third deck, two on the hangar deck, five on the gallery deck, and two in the island structure; at the Marianas this arrangement was found to give the best medical coverage.[75] Ventilating difficulties in the sick bays and dressing stations were experienced aboard the battleships and as a result many patients experienced respiratory difficulties. Moreover, the temperatures of 110° and 120° Fahrenheit in which the medical staff was forced to work were a source of great discomfort and were believed to reduce its efficiency.

Definitive medical treatment was occasionally performed on the larger ships of the line where there was adequate medical staffing. However, serious cases were customarily transferred to the hospital ships, as was the case with the wounded of the USS SOUTH DAKOTA and USS CALIFORNIA off Saipan. The use of sodium sulfathiazole for the seriously wounded, blood banks and plasma to combat shock and bleeding, petroleum gauze in burn cases, and light plaster bandages for a variety of wounds was general on the line vessels.

Another feature of the battle afloat was the enforcement of sanitation aboard the ships of the line, since the outbreak of an epidemic could disable a ship just as effectively as gunfire.

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75. Action Report, USS BUNKER HILL, Marianas, p. 54.

Enteritis and dysentery were the most frequent disturbers and they were present to a limited extent on a number of fighting vessels during the Saipan engagement. Only on the USS BIRMINGHAM, however, did these factors play a serious role. By 10 June (D minus 5), bacillary dysentery had affected 244 persons on the cruiser. Rigid sanitary precautions--sterilization of mess gear, insuring the washing of hands with antiseptic solutions, and inspection of food handlers--soon reduced the incidence. Treatment with sulfa, penicillin, intravenous glucose, and occasional blood transfusions, where necessary, made it possible for all ambulatory cases on the BIRMINGHAM to man their battle stations by the fourteenth of June.[76]

Sanitation Problems Ashore

The Marianas Islands were free of malaria at the time of the American invasion, but dengue-carrying mosquitoes hung in thick swarms over the western side of Saipan, and the islands were noted for respiratory disease. Bacillary dysentery was known to be present. To meet these and other threats to the health of the invading forces, preventive sanitary measures were emphasized throughout the campaign. Success, however, was limited. Adequate fly control was not possible because of heaps of crushed sugar cane and the presence of numerous unburied, unsprayed dead. A preparation called "Seat" was

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76. Action Report, USS BIRMINGHAM, 11 July 1944, p. 33.

was effective against mosquitoes, but screening was still necessary and was not adequate to cover all mess halls. Care was taken with slit trenches, however, and heads, when installed, had box-type covers and were screened with Japanese mosquito netting when it was available. All garbage was either burned or buried.[77]

Water supplies were plentiful on the island, and the early establishment of American purification units at springs provided adequate quantities. Japanese infiltrators frequently attacked the sources of water supply, however, and insufficient personnel were allotted the utilities sections to provide necessary guard facilities.[78]

Following the Saipan operation, recommendations were made for the further provision of from four to six men for assignment to each battalion for spraying the dead, maintainance of fly and insect control, and general supervision of field sanitation. Increased supplies of screening materials and insecticides were also recommended.[79]

The effectiveness of the sanitation program in the Saipan invasion was difficult to measure. The percentage of dengue and dysentery was rather high, but the battle conditions

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77. Action Report, ComGen 4th MarDiv, Saipan, p. 383.
78. Ibid., p. 267.
79. Ibid., p. 384.

were difficult, and the casualty rate heavy, obviating a perfect performance of sanitation planning. Once the military situation was under control, more effective sanitation was possible in the rear areas--the dead were disposed of and screening was increased.

Civilian and POW Care

The Saipan invasion provided the Navy with a serious new problem in caring for large numbers of sick and wounded enemy civilians and POW's. Adequate preparation for this situation had not been made, and the results were proportionately chaotic. Writing to Admiral McIntire three weeks after the invasion started, Admiral Chambers declared:

> The Saipan situation, as you know, was a much harder operation than anticipated but it certainly brought out some very important lessons for future applications. In Saipan, for instance, there was supposed to be a native population of about 20,000. These were mixed Japanese, Koreans, Chamorros and Kanakas. The Civilian Affairs Administration went into Saipan about D plus five but without facilities. Before I left Saipan there were over 16,000 internees, about 10 percent wounded or sick. This Internees' camp was one of the biggest problems from a medical standpoint as limited medical personnel from field units had to be diverted to this work. All of this in addition to caring for our own and enemy prisoners of war wounded. The physical conditions of the civilians on arrival in camp was poor--tetanus was not uncommon with a high mortality rate. [80]

The Civilian Affairs Unit which went into Saipan on D plus 5 consisted of one surgeon from the public health service and one

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80. Letter from Adm. W. Chambers to Vice Adm. R. T McIntire, 10 July 1944, n. p.

pharmacist's mate first class; their equipment consisted of one medical officer's field kit and one hospital corpsman's field kit.[81] Nearly all of the inhabitants of the island were to become charges of the Navy Medical Department from one cause or another. Many hundreds had been injured during the battle, as their homes were pounded to rubble by American guns and planes; and disease and epidemic illnesses were aggravated by invasion conditions. Adequate care had not been provided for these non-combatants in the planning and, although those who were finally faced with the problem did a highly commendable job, there was a death rate of over 30.58 percent.

An urgent call for help brought an additional medical officer and seven hospital corpsmen on D plus 10, and on D plus 21, another medical officer and a pharmacist's mate. Scouting missions turned up Japanese medical supplies which were used solely for prisoners of war and enemy civilians.

Two months after the initiation of the Saipan invasion an Army military government program with Army hospitalization for 500 had been set up in the civilian internment camp, but the first weeks were a most difficult period for the civilians who crowded the tiny military government sick bay at the rate of 950 a day.

By 9 August 1944, Japanese military dead on Saipan totaled

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81. Alex C. Luna, "Military Government Duty", Hospital Corps Quarterly, Aug. 1945, p. 33.

23,811, while prisoners of war numbered 1,856. Many of those surrendering to the American forces were found to be wounded. Most of the wounded Japanese military prisoners were evacuated to the ships for medical care, and as a result, they fared better than the civilians. More than half of the prisoners taken were Korean, while the remainder constituted about 4 percent of the total Japanese garrison on the island.

The battle for Saipan was a difficult and costly one from a military as well as a medical viewpoint. It brought to light Navy medical needs and deficiencies, medical strengths and weaknesses. It made clear the need for more hospital facilities, and for a greater centralization of those facilities; for better organization of collecting stations, and for improvements in both the sea and air evacuation procedures. It highlighted the value of whole blood transfusion, the need for greater quantities of some medical supplies and smaller amounts of others, and the necessity of caring for large groups of enemy civilian wounded in future island campaigns--if only to protect our own troops from disease epidemics. [82]

The personnel performance of the medical staff was in most cases highly commendable, and personnel worked under trying

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82. Action Report, 2nd MarDiv, Saipan, p. 9.

battle conditions for long periods. Saipan was to point the way to the later invasions, where Navy medicine was to profit by the experiences gained in this first battle of the Marianas.

Section 2 - Tinian

When Saipan was finally secured, the American troops braced themselves for the next phase of the Marianas campaign - the conquest of Tinian, thirteen-mile-long neighbor of Saipan. Tinian, an island of volcanic origin, had a civilian population of over eleven thousand in addition to the heavy Japanese military garrison.

The Fourth Marine Division, which was to spearhead the attack, was moved to a rest area on Magicine Bay, Saipan, for seven days previous to the invasion date. Here the medical department screened the troops as well as possible to remove individuals operating with hitherto undetected wounds or disease. Transfers were made among medical personnel to balance the depleted strength of the medical battalions, and the medical dumps opened their bales to supply drugs and bandages on the basis of a 25-30 percent casualty expectancy.[83]

The northern portion of the island was chosen for the attack, despite its narrow beaches flanked with six to eight feet

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83. Action Report, ComGen 4th MarDiv, Tinian, p. 92.

coral banks. The main Japanese defenses were concentrated around Tinian Town to the south, and the American artillery on Saipan had already pounded this area thoroughly. Supplies for the venture had been collected on Saipan except for petroleum products and certain types of ammunition which were readily accessible on ships in the harbor. The greatest hazard was the weather, for the constant threat of the typhoon season hung over Tinian, and huge breakers on the beaches might wreck the landing.[84] Plans were laid to use planes for parachute delivery of supplies and evacuation of casualties if the necessity arose.

Debarkation and Assault

On the morning of 24 July, the boats set forth from Saipan carrying their tense loads over the two and one-half mile stretch of water to Tinian. Behind them were heard the reverberations of the heavy artillery pointed at Tinian Town; overhead the roar of American planes with bomb loads from Isely Field on Saipan dinned constantly. The troops, contrary to the Saipan experience, were able to gain the beachhead swiftly and progressed inland at a fairly rapid rate. This initial success made possible the establishment of hospitals at an earlier date than in the previous campaign. The Second Marine Division which followed on the heels of the Fourth was advised that the beachhead was secure before it disembarked.

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84. Action Report, Com Task Force 52, capture of Tinian, p. 3.

As at Saipan, company aid men with their equipment were debarked directly with the attacking platoons. Battalion and regimental medical sections were debarked with their respective command posts. In the Fourth Marine Division, D Medical Company and a section of H and S company, Fourth Medical Battalion, landed on the afternoon of J-day while E Medical Company landed on J plus 1. The companies were combined and prepared to set up and operate a division hospital by J plus 2. The hospital operated, however, as an emergency surgical unit only. All medical cases and ambulatory patients were evacuated directly to Saipan hospital facilities, and the surgical cases to Saipan or to hospital ships as soon as they had convalesced sufficiently to be safe for moving.[85]

The Second Marine Division set up hospital sections of D and E Medical Battalions on J plus 2, and the Division medical personnel were not called upon to man shore party evacuation posts. The collecting sections of both divisions functioned under control of the regimental surgeons, and there was a better organization and smoother operation of these units than at the Saipan beaches. This was in large part due to the relative ease in the securing of the beachhead and the early establishment of medical organization, but the disorganization of the Saipan beaches had taught a useful lesson as well.

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85. Action Report, ComGen 4th MarDiv, Tinian, p. 93.

The landing of medical equipment functioned smoothly during the assault and debarkation phase. Each medical company had been equipped with two one-ton trucks, five jeep ambulances, and one reconnaissance jeep, and these, loaded with supplies, were landed successfully with their five-day supply.

Evacuation

The problem of evacuation at Tinian was much less difficult than that faced by the medical department at Saipan. The casualties were considerably lighter, and at no time were beaches crowded with waiting wounded. After the fourth day, the rise of high seas made it impossible to evacuate by water, and air evacuation was instituted. Another valuable asset to the medical department was the American hospital facilities on nearby Saipan to which casualties could be evacuated. This did not necessitate a total reliance upon transport and hospital ships as had been the case at Saipan.

The evacuation plant at Tinian had provided for initial evacuation to the transports via LCVP's, and a transfer area was charted close to the beaches for the shifting of the casualties from the amphibious vehicles to the LCVP's.[86] The establishment of a pontoon causeway pier on J plus 1 to Beach White One permitted the embarkation of casualties directly to LCVP's without the necessity of further transfers in amphibious vehicles. The trans-

86. Action Report, Com Task Force 52, Tinian, pp. 52-53.

ports then shifted the more serious casualties to the USS RELIEF or USS TRYON which were anchored off Saipan, while the less serious casualties were landed on Saipan and cared for by the facilities of the field hospital there. During the campaign the plan was modified to allow the evacuation of White casualties directly to Saipan, thus eliminating the intermediary step of the transports.

Little overcrowding of the transports occurred, and in nearly all cases prompt and efficacious treatment was possible.[87] An increased number of jeep ambulances had been made available for the Tinian operation, and they were able to operate with great success on the well organized beachhead. As the troops progressed inland, an excellent road net was established, and ambulance jeeps bumped down to the water in rapid sequence. At Tinian, the ambulances had been landed on the afternoon of J-day, a departure from the Saipan operation.

The outstanding feature of Tinian evacuation was the heavy dependence on air evacuation. It had been employed to a limited extent at Saipan, but with very unfavorable results, as no provision had been made to survey casualties for air transports or to care for them en route. With the advent of typhoon seas on J plus 2 making it impossible to evacuate by water after J plus 4

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87. Action Report, Com LST Flotilla 13, Tinian, pp. 5-6.

until the capture of Tinian Town and harbor on 1 August, air evacuation was the only practicable solution. The air evacuation unit was set up on Ushi Airfield, and the program was put under the charge of a medical officer of the Second Marine Division. Approximately 1,500 casualties were evacuated by air to Saipan despite the hazardous winds which blew over the islands. Arriving at Aslito Airfield on Saipan, the wounded were evacuated with dispatch to the corps hospital group at White Two where a system had been set up for processing the injured. They were sorted according to the nature and seriousness of their wounds and sent to either hospital ships and transports or to the corps hospitals on land.[88]

A shortage of litters caused occasional delays in the otherwise well planned Tinian evacuation program, but the contrast with the evacuation melee at Saipan was marked. Better organization, swifter adaptation of facilities to immediate exigencies, and the helpful presence of a nearby friendly island contributed to the success of evacuation at Tinian.

Hospitalization

The hospital facilities set up on Tinian by the Second and Fourth Medical Battalions had a peak bed capacity of 1,250 beds in the joint hospital. In addition, two portable LST's were

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88. Action Report, Transport Quartermaster, Tinian, p. 682.

set up as surgical hospitals, but these did not operate after the fourth day because of the weather conditions. The rapid evacuation from Tinian prevented overcrowding of these facilities at any one time. The Tinian hospital, of course, was only an evacuation hospital and did not provide sustained care and treatment. After the island was secured, the equipment and facilities of the Second and Fourth Medical Battalion hospital were turned over to the medical components of the garrison forces, and all but one company were withdrawn. Garrison hospitals served a primary need in the Pacific campaigns. As at Tinian, they were set up rapidly following island operations to prepare for the casualties of the next operation, which was frequently almost simultaneous with the last.

Civilian hospitalization, as at Saipan, was inadequate to meet the flood of sick and wounded who came to the enclosures during and after the operation. A 100-bed G-6 unit for civilian use was scheduled as the second ship of the garrison supply. It was to have arrived on J plus 4 to 6 and have been completed by J plus 6 to 8. It arrived on J plus 16, so that the real burden for care of civilian casualties fell upon the medical companies of the assault divisions. These battalions did assume the task of civilian care, and with limited supply at their disposal, did an excellent job as far as they were able.[89]

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89. Ibid., p. 684. A table of Tinian hospitalization appears in Appendix D.

The nine-day struggle at Tinian resulted in 1,829 American casualties, as opposed to 6,050 Japanese killed and 255 captured. Of the American casualties, 290 died in action, 1,515 were wounded, and 24 were listed as missing in action.[90] Fifty-two medical personnel in the Fourth Division alone were injured. Persons put out of combat as a result of dengue, combat fatigue, dysentery, fungus infection, psychoneurosis and other illnesses came to well over a thousand in both divisions. In comparison with the total Saipan casualties of 16,525, however, casualties at Tinian were light. Medical planning for the Tinian operation had anticipated larger numbers.

The Tinian Off-Shore Struggle

During the initial assault and bombardment of Tinian on 24 July, the enemy's shore batteries pounded the attacking line vessels heavily and scored a number of direct hits. The account of the USS COLORADO, which suffered 22 direct blows from the Japanese batteries, gives a vivid report of medical department performance in the battle afloat. The hits all landed within fifteen minutes, and the resulting conditions on the ship called forth the strenuous efforts of medical department personnel.

One of the first hits landed in the sick bay office, striking the senior medical officer with fragments, damaging

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90. Action Report, Com Joint Expedit. Forces, ComPhibForPacFlt., Tinian, p. 259.

many facilities and putting the 32 beds temporarily out of use. Immediately after the first hit, all casualty collecting stations throughout the ship began functioning, but they were rapidly swamped.[91] The foundry on the galley deck level had been designated as a collecting station for wounded from the topside areas but it was so heavily damaged that it was rendered useless. The main galley nearby, with its ranges and large steel table, was quickly chosen as replacement, and to this were carried severely wounded stretcher cases for initial first-aid treatment and dressing. As casualties continued to pour in, they were moved from collecting stations all over the ship to the large emergency wards on the second deck. Most of the injured came from the boat deck and other exposed parts of the ship.

Few intracranial injuries occurred, as most of the men were wearing helmets. There were also relatively few penetrating wounds of the abdomen. Hemorrhages, compound fractures of the extremities and soft tissue injuries presented the most numerous and severe problems. The treatment included control of bleeding, checking of shock, and splinting of fractures so that the patients could be transferred for definitive treatment. Burns were treated with large amounts of petrolatum and the men were left on stretchers or in bunks until transfer. Lacerated wounds of the

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91. Action Report, USS COLORADO, Guam-Tinian, p. 104.

soft tissues were dusted with sulfanilamide powder and bandaged. No sutures could be performed, but corpsmen, dentists and doctors combined in the administration of plasma to control shock.

The account of personnel reaction to the emergency is interesting. "During all of the excitement of being hit, firing at the enemy, seeing mangled bodies and wounded shipmates", wrote the senior medical officer, "no one exhibited any hysterical reactions or maniacal tendencies, nor was there any unnecessary shouting at one another. Everyone seemed to rise to the occasion and performed his duty befitting a real Navy Man." Special commendation was given the hospital corpsmen sho behaved with "admirable calm" and were too busy aiding the wounded to become excited. So strong was the fighting spirit or sense of duty of some of the men at gun stations that cases were reported of critically injured personnel, with a hand or foot blown off, continuing to man their stations, with fatal results from loss of blood.

At 1800 of that day, all serious and critical cases were transferred to the USS TRYON at Saipan; the majority of the fifty-four severely injured were suffering with wounds of the lower extremities. Ninety-one moderately wounded remained. In all, during the fifteen minute period, the COLORADO sustained 241 casualties, with 43 dead and missing.

An analysis by the COLORADO's medical officer of the lessons learned from the attack embodied the following conclusions: the number of expected casualties should never be underestimated; dispersion of medical materiel and men is essential; first-aid instruction is almost as important as gunnery drills; the importance of wearing identification tags should be stressed - many dead and wounded did not wear identification tags with resulting difficulties in identification; better medical records are needed; and preparation must be made for Alternate Casualty Collecting Stations, in case one or more is rendered useless.

The Problem of Sanitation

To a large extent the sanitary problems present at Tinian were a duplication of those experienced at Saipan, but evidence indicates that there was less sanitary control than was exercised in the first Marianas campaign.[92] This is attributed to an early reluctance of the unit commanders to designate sufficient personnel for an island sanitary organization.[93] In addition, the sanitary supplies included in the original landing supply were soon exhausted, and no replacements were made available until eight days after the garrison forces arrived. The rapid advance into Tinian also hampered any program of early sanitation.

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92. Action Report, Com V Phib. Corps, Tinian, p. 5.

93. Memo from Capt. T. S. Carter to the Surgeon General, 27 Sept. 1944, n. p.

Tinian itself was a comparatively healthful place in pre-war times, with a moderate climate. No malaria or filariasis vectors were present. However, many of the troops had been previously infected in other campaigns. Bacillary dysentery and dengue were endemic, with abundant carriers and vectors. Following the close of the Tinian campaign, increasing numbers of personnel were listed as ineffectives from enteric disease, arising basically from poor sanitary conditions.

Mess halls went unscreened and flies, nurtured by food debris, feces, and occasional corpses, made their way freely to the men's food. There were only 400 prefabricated flytraps on the entire island to keep them in check. Two thirty-gallon drums of sodium arsenite were available to the Second Marine Division, but the use of this had to be confined to the heaps of enemy dead about the lake.[94] So clouded was the island with insects that the commander of the USS WALLER, which was anchored in the harbor, reported the invasion of "vast hordes of local flies, of large size and amazing tenacity..(on which) direct hits were necessary to discourage their activity."[95]

Both the planning and execution of sanitary measures in the Tinian campaign left something to be desired to meet

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94. Action Report, 2nd MarDiv., Tinian, Sect. VIII, p. 15.

95. Action Report, USS WALLER, Tinian, p. 10.

the high standards set by the Medical Corps as a goal.

Island Prisoners

Japanese civilians and military personnel on Tinian had been thoroughly drilled by Japanese propaganda to the belief that their surrender to the American forces would mean torture and death. A strong counter-propaganda movement was launched by American intelligence units, including the scattering of Japanese language leaflets by plane urging surrender and the use of loudspeaker trucks manned with personnel who spoke Japanese travelling along the front lines. This counter-propaganda was believed to have been effective in countermanning the Japanese indoctrination.[96]

A total of 10,676 civilians in various stages of medical healthwere finally interned in the center of the island. Thirty-two percent of those treated died as a result of gunshot wounds, while the remaining illnesses were attributed to tuberculosis, eye diseases, helminthic infections, tetanus, pneumonia, gas gangrene, and malnutrition.[97]

The commanding general of the Fifth Amphibious Corps stated that "insufficient hospitalization facilities" for civilian wounded were present at Tinian, as at Saipan. This

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96. Action Report, 2nd MarDiv., Tinian, Sect.V, p. 8.

97. Memo of Captain Carter to the Surgeon General.

was not due to bad planning on the part of the medical department, but for the most part upon exigencies of shipping priorities. During the critical period until civilian facilities were set up, the two medical battalions of the assault forces accepted the responsibility for the care of the civilians, and did a heroic job with the inadequate personnel and materials at their disposal.[98]

It was recommended for future operations that if it was planned to care for the civilian populations, a well stocked dispensary unit having three times the supplies of a G-10 unit and staffed with two medical officers and eight hospital corpsmen for each 6,000 population be emberked with the assault forces. This should be landed as s on as the tactical situation would allow.[99]

As time and additional shipping brought further medical supplies and personnel to Tinian, the civilian population began to realize that the Japanese propaganda was false. By the end of October 1945, dispensary treatments were being administered to the internees by the G-6 dispensaries. Volunteer native nurses were recruited and outfitted, and proved quite effective.[100] A good medical program had been

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98. Action Report, ComGen, V Phib Corps, Tinian, p. 5.

99. Memo of Captain Carter to the Surgeon General,

100. Excerpts from Medical Department Report, Medical Activities on Tinian, 1 Oct. through 31 Oct, 1944, pp. 28c-32c, Surgeon General's files.

made available to the enemy civilians.

The work of the Navy medical department at Tinian showed a marked improvement over earlier campaigns. Casualties were lighter than had been anticipated, so that the medical staff and its supplies and equipment proved to be ample. The evacuation by sea, and especially by air, was handled more effectively than at Saipan and in the earlier Pacific campaigns. There were still shortages of litters and inadequate medical supplies for civilian needs. Occasionally, as a result of faulty distribution, there were insufficient supplies for American wounded.[101] But the operation proved the effectiveness of the newly initiated use of a medical control vessel at the transfer point off the beaches. It is significant that in the few days between the Saipan and Tinian invasions the Medical Corps was able to adapt its plans to the situation and make valuable use of the mistakes and deficiencies of the Saipan campaign to improve medical care at Tinian.

Section 3 - Guam

The Guam campaign, although an integral part of the Marianas operation, was conducted on a separate basis from the Saipan-Tinian maneuver. Inasmuch as Guam was some hundred miles below Tinian and Saipan, a separate force, the Southern

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101. Action Report, ComTransDiv 7, Tinian, p. 17.

Troops and Landing Force, was allocated the task of recapturing the former United States possession.

The mounting area for the Guam attack forces was Guadalcanal and here were collected the units which were to make up Task Group 56.2, commanded by Maj. Gen. Roy S. Geiger, USMC. W-day (Invasion day) was set for 21 July, and the Guam campaign in all was over by 10 August.[102] Preparation for the assault was as careful and detailed as for Saipan and Tinian. Inter-ship medical conferences were held and supplies standardized as much as possible. The majority of the APA's which embarked for Guam had participated in previous operations, and in general their medical departments were well indoctrinated in Pacific island warfare.[103]

The Southern Attack Forces had been designated as possible reinforcements for the Saipan campaign should events demand their use. Loaded on their ships, they waited off the Saipan shores until 24 June when they were ordered to return to Eniwetok. On 14 July they reembarked for the Guam campaign and on 21 July arrived off the island in the early morning. H-hour was set for 0830. The Third Marine Division landed on the northern beaches between Adelup Point and the mouth of the Tatagua

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102. This Task Group included Corps Troops, III Phib Corps, 3rd MarDiv, Corps Artillery, First Provisional Marine Brigade, and the 9th and 14th Marine Defense Battalions.

103. Action Report, Com Task Force 53, Guam, p. 163.

River, while a second attack force stormed the southern beaches between Agat Village and Bangi Point.

Relatively light beach resistance was met, largely because of the heavy bombardment by the assault ships previous to the landings. As the American troops pushed inland, however, the Japanese fire took a heavier casualty toll.

Medical Aid on the Beaches

Medical personnel attached to the Third Marine Division, First Provisional Brigade, and the other participating units were debarked from the transports in Higgens boats which carried them as far as the coral reef. From there the men either waded ashore or clambered aboard DUKW's and amphibian tractors which took them to the mainland. During the Guam campaign there was little delay in putting medical personnel and supplies ashore. The headquarters battalion of the Third Marine Division landed at H plus 6½ hours, complete with its medically-loaded jeep ambulance. The Third Medical Battalion reached the shore at H plus 11. Even malaria and epidemic control personnel were debarked shortly after H plus 60.[104] Individual corpsmen attached to each assault platoon and landing with the battle forces had, of course, preceded the medical units.

Battalion aid stations were set up near the battalion

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104. Action Report, 3rd MarDiv., Guam, Enc. I, n. p.

command posts and along the natural lines of drift, on roads and trails. The medical installations were forced to provide their own security, and in many instances this was difficult. As much advantage as possible was taken of natural barriers, trees, and bushes. To these, corpsmen added foxholes, sandbag placements, and barbed wire. Guards were posted against enemy infiltration at night.

Of great value were the trained beach party medical sections from the ships. In many instances they acted as evacuation stations in conjunction with the shore party medical sections. Others, during the early hours, established forward first-aid stations at the edge of the beaches. Those landing later on W-day, as did the USS WILLIAM P. BIDDLE medical beach party, found their most useful function in supplying already established units. The BIDDLE crew constituted itself a continuous supply center for aid stations near the line of fire and maintained a steady stream of stretchers, plasma, bandages, and other medical supplies as called for.[105]

Medical resupply on the beaches on the whole was conducted efficiently. In the Third Marine Division, no serious shortage of essential equipment was reported from any unit.[106] The First Provisional Marine Brigade reported

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105. Action Report, USS WILLIAM P. BIDDLE, Guam, p. 6.

106. Action Report, 3rd MarDiv, Guam, Enc. I.

medical resupply to be satisfactory at all times. A ten-day supply of first-aid equipment was carried in with the early echelons of medical personnel. A neurosurgical unit with suction apparatus and coagulating machine was an itme felt desirable in the early phases of the campaign by one medical unit.[107] Beach party medical teams complained that the absence of lightproof dressing stations handicapped them in carrying on their work.

Evacuation

The evacuation story at Guam was different from that of either Tinian or Saipan. No air evacuation was used, entire reliance being placed upon sea facilities. Moreover, there were no serious weather hazards complicating the procedure as at Tinian. Guam casualties were only about two-fifths the number of the Saipan casualties; thus the beaches were never as heavily crowded as Saipan with wounded who had to wait long hours for evacuation and further medical attention.

An especially valuable aspect of the evacuation at Guam was the use of specialized LST's for medical and surgical evacuation. Two LST's equipped with surgical teams were set aside for surgical cases, while five LST's acted as medical evacuation ships. Surgical ships were equipped with three sections: liaison teams, resuscitation teams, and surgical teams for, respectively, liaison

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107. Ibid.

with the beach dressing stations, diagnosis of injuries and dispensing of initial shock treatment, and, finally, definitive surgical procedures. The medical ships were staffed with one medical officer and three corpsmen, and evacuated slightly wounded ambulatory casualties, neuropsychotic cases, those ill with malaria, and other sick personnel.[108]

These emergency evacuation ships, as the LST's were known, proved to be of great worth in the integral scheme of evacuation.[109] Without the presence of a reef, the LST's would have been even more valuable as direct hospital evacuation ships. In many cases it was easier to take casualties directly out to close-lying transports in amphibious vehicles than to first route them via the LST's. One of the surgical LST's was stationed over 6,000 yards from the beach during the early phases of the landing, and the coxswains of the LCVP's and LVP's, sometimes apprehensive of the medical condition of the casualty loads they carried, steered straight for the nearest transports. The LST was finally moved into a more suitable position.[110] The actual work done by the LST's in collecting and caring for the wounded until they could be transferred to transports or hospital ships, cannot be too highly commended. In reference to a recommendation that more

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108. Action Report, Task Unit 53.3.6, LST Group 15, Guam, p. 6.
109. Action Report, ComTransDiv 4, Guam, p. 31.
110. Action Report, USS RINGOLD, Guam, p. 29.

LST's, completely hospital equipped, be provided, the commander of the Amphibious Forces, U. S. Pacific Fleet, stated that troop handling and cargo capacity would be impaired were this to be carried out. Admiral Turner, recognizing the injurious effects to casualties of numerous transfers, upheld hospital LST use in emergency only, but proposed more dependence upon the evacuating facilities of the APA's for normal evacuation purposes.[111] Actually, the majority of the 581 wounded who were evacuated on the USS SOLACE on W plus 5 had been evacuated directly from the beach to the hospital ship.[112]

Despite orders that coxswains of unloading boats report to the control boat after unloading, many failed to do so, and it was necessary to round up these vessels and escort them to the control boat so that they would be available for casualty carrying.[113]

Interesting observations were made during the Guam campaign regarding the adequacy of the various boats employed in the evacuation process. The DUKW's received the highest praise from almost all participating units, while LVT's were subject to criticism. Only two litter cases could be accommodated on each LVT, and no provision had been made for holding

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111. Second Endorsement to Action and Operation Report, ComTransDiv 4, Guam, pp. 2-3.

112. Action Report, Com Task Force 53, Guam.

113. Action Report, USS LAMAR, Guam, p. 8.

the litters in place. This meant that manual means had to be employed, a poor arrangement at best. Ambulatory casualties often had to sit in precarious positions on the LVT's.[114]

Some Marine units stated that although their jeep ambulances were not in good running condition, they were essentially satisfactory vehicles for land transportation of wounded, and more of them in better repair would have been useful.[115]

The over-all picture of evacuation at Guam under battle conditions was an adequate one. Despite a rugged terrain over which wounded frequently had to be hand-carried for long distances and despite the shortages of land evacuation vehicles, all wounded were evacuated in a relatively short time, except those brought in at night. Less than an hour after the troops landed, casualties were being received aboard the APA's. Because of the brevity of the campaign, all beach evacuation stations were discontinued after W plus 12 and all casualties were evacuated from the Corps Medical Battalion in the southern area and from the Third Division Hospital in the northern area.

Assault Force Hospitalization

Two main hospitals for the assault forces were established in Guam. The Third Marine Division Field Hospital,

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114. Action Report, USS FAYETTE, Guam, p. 28.

115. Action Report, 3rd MarDiv., Enc. I.

operated by two medical companies, was first set up two miles south of Agana in a narrow ravine. At Agana itself, use was made of the buildings of the pre-war U. S. Naval Hospital, some of which had been destroyed by the naval bombardment, and all of which had been damaged. Forty-eight hours after the capture of Agana, bulldozers were at work clearing out debris. A short time later the Third Division Field Hospital moved into the old tuberculosis building, an adjacent galley, and a portion of the hospital corpsmen quarters. This was safer and easier to defend than the Division's earlier quarters in the ravine, which had already been the object of one early morning Japanese infiltration. Doctors, corpsmen, and ambulatory patients had held off the Japanese until reinforcements of nearby Marines arrived and routed the enemy after a four-hour struggle.

On the southern beaches the commanding officer of the Third Corps Medical Battalion went ashore on W plus 2 to reconnoiter for a location. Although he was advised by Brigade Four not to land the medical battalion until a more suitable area could be provided, all medical personnel were landed on the narrow beachhead that afternoon. They were forced to dig in and establish themselves in a small area where a single, well-placed Japanese bomb could have wiped them out. For three nights medical personnel were crowded into this tiny area, but on W plus 5 they were able to set up a field hospital one mile north of Agat. Two hundred fifty beds were

set up, complete with operating rooms, X-ray, laboratories, dental facilities, and other necessary offices. On W plus 7, the facility was opened and received military and civilian patients. Over 250 additional cots were provided daily obtaining a maximum space of 1,250 beds.[116]

Both hospitals operated satisfactorily during the campaign. A notable handicap occurred in feeding of patients due to a lack of mess gear. Conditions were primitive in comparison with a smoothly running shore establishment, but the wounded received definitive treatment and were adequately hospitalized until it was possible to move them to more complete facilities.

Casualties

The preliminary heavy naval and air bombardment no doubt reduced the number of American casualties at Guam and materially increased the Japanese toll. The Third Marine Division alone buried 6,553 enemy dead, and it was estimated that another 2,000 remained to be buried in the Division's twenty mile zone of action. In return the Japanese killed 620 men of this Division and wounded 2,924. Sixty-five were missing in action, which brought the total to 3,609 for the Third Division.

In all, 1,289 Americans died at Guam, 5,648 were wounded

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116. Action Report, Commander III Phib Corps, Marianas, p. 158.

in action and 148 listed as missing action. Next to the Third Marines, the 77th Infantry Division, USA, lost the greatest numbers - 405 killed, 1,744 wounded and 51 missing. In the First Provisional Marine Brigade, 191 were killed in action, 704 wounded, and 20 missing. The Third Amphibious Corps Artillery suffered only 4 deaths and 12 wounded, but the Corps Troops lost 69 killed, 264 wounded and 12 missing.

Casualties among medical personnel were rather high, in some units, and replacements were insufficient.[117] Medical personnel of other units, however, were unharmed and were able to function at Table of Organization strength.

Sanitation

The problem of sanitation in Pacific Island areas had necessitated much Medical Department research and planning. For the Guam campaign, however, the Navy had the advantage of an intimate knowledge of the island and its health and sanitation problems. All medical and sanitary care on Guam had been under the supervision of the Navy Medical Department before the war, and some of those who returned to the island in the American invasion had formerly worked with these problems on Guam.

The entire Marianas, it was known, were free of the malaria-bearing anopheles mosquito, but the aedes aegypti mosquito,

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117. Action Report, 3rd MarDiv., Guam.

transmitter of dengue fever and potential vector of yellow fever, was abundant. The crab louse, tick, and mite were inhabitants of Guam, but were not known to be disease transmitting.[118] The house fly, transmitter of enteric diseases, was also an unwelcome occupant.

General sanitary and medical conditions on the islands even before the Japanese seizure were not admirable. Congested native quarters, especially in Agana, were rampant with fly-breeding filth.[119] Overcrowding favored the wide dissemination of tuberculosis, the leading single cause of death in Guam.[120] Some progress had been made in reducing the incidence of yaws, leprosy, worms, and introduction of typhoid vaccination and courses in elementary hygiene.

While sanitary conditions had been bettered under U. S. naval administration before the war, there had been a need for larger appropriations and trained personnel to bring adequate sanitation to Guam. In 1939 the commandant of the naval station had reported:

> Except for inadequate and piecemeal expenditures of local government funds, no general approach has been made in preventive measures in safeguarding health of naval personnel stationed in Guam. Such semblance to modern living conditions as do exist today in the housing of naval personnel has been brought about by improvements in living quarters made at the expense of the individual.[121]

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118. War Department Bulletin, 23 June 1944, p. 3.
119. Annual Sanitary Report, U. S. Naval Station, Guam, 1939, p. 19.
120. Annual Sanitary Report; U. S. Naval Station, Guam, 1940, p. 6.
121. Action Report, U. S. Naval Station, Guam, 1939.

One of the most important sanitation factors on the island was that of providing a safe water supply. Troops going into Guam were warned that all water was unsafe until proved otherwise. No natural purification of the island's water supply could be provided by the thin soil cover, the permeable limestone and the volcanic rock formation.[122] What sewerage there was did not operate satisfactorily because many of the systems were below sea level, preventing adequate flushing into the sea. This was especially true of interior regions. As early as W plus 2, purification units were placed in operation. These were increased in number, as conditions permitted, at all accessable water points. Sufficient water supply equipment had been provided for the operation, but because of a lack of spare parts and extensive use of the equipment aboard ship before the landings, much of the gear was in poor condition.[123]

General sanitary measures were carried out as well as possible under battle conditions. Especial attention was paid to the cleaning away of debris around camp areas and to the location and proper construction of heads. Fly-proofed and screened latrines in the Third Amphibious Corps were not supplied as early as in the Third Marine Division. Scarcity of water made bathing "difficult if not impossible for the men" except when rain water was available.[124]

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122. War Department Bulletin, 23 June 1944.

123. Action Report, 3rd MarDiv., Guam, Enc. F, p. 7.

124. Ibid., Enc. I.

Galleys were supervised at all times, although combat difficulties hampered the sterilization of mess gear. It was possible, however, for the commanding officer of the Third Marine Division to report that "sanitation was basic and in general good."[125]

Related to sanitation was the problem of burial of the dead. American dead received burial in the Third Marine Division cemetery commencing on W plus 2, with few lags in the burial program. Enemy dead handled by this unit were sprayed with 2 percent sodium arsenite and buried as rapidly as possible - for the most part in shell holes. Native labor proved valuable in this task after the early combat stage was over. The First Provisional Marine Brigade did not have a supply of sodium arsenite available until after the need for it has passed, but the brigade buried the dead as quickly as the military situation permitted.[126]

It is interesting to note that medical and sanitation factors were not felt to have had much effect upon the outcome of the operation as far as the enemy was concerned. Tropical attrition, enteritis, and dengue seemed to have had far less effect upon the Japanese forces than in the Bismarks, Solomons,

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125. Ibid.

126. Action Report, First Provisional Marine Brigade, Marianas, p. 34.

and New Guinea, where medical factors operated in our favor.[127] Neither were sanitary factors so significant as to affect American forces seriously during the relatively brief course of the campaign. Once the island was secured, it was a much easier matter to effect the proper establishment of sanitary conditions on Guam.

Problems of Civilian Care

In 1940, the total native population of Guam was 23,348. The people were of mixed blood, largely Chamorro, with some Spanish. Following the conquest of their island by the Japanese, the natives were reasonably well treated at first, but from the spring of 1944 on, Japanese treatment had become harsher. Many were driven from their homes to provide shelter for the reinforcements augumenting the island garrison, and then were obliged to live in caves and in the woods. They were made to provide forced labor for the Japanese, and food was withheld from them if they refused to work. With this background of inadequate food, insufficient shelter, bad water and sanitation, and overwork, the health of the native population had greatly deteriorated by the time of the American reoccupation.[128] Moreover, the heavy bombardment of the island had destroyed a large percentage of native dwellings, especially in Agana, and wounded many hundreds of the natives. Navy medicine had a serious problem on its hands to care

127. Action Report, Com III Phib Corps, Marianas, p. 76.

128. Ibid., p. 77.

for Guam's civilians.

As at Saipan and Tinian, the provision of medical supplies for civilians through the medical staffs of combat units had been disapproved, and none were embarked for the campaign. Unfortunately no medical supplies for civilians had been provided for by Civilian Affairs, the Garrison Force, or the Island Command during the assault phase, and thus the medical personnel were forced to makeshift with whatever they could obtain. The USS BOUNTIFUL was able to supply the essential items of a 100-bed hospital, and the 77th Army Division loanded several wall tents to the Third Amphibious Corps to set up some facility for the civilian injured and seriously ill.[129]

Large dependence was placed upon the use of captured Japanese medical supplies in treating the Guam civilians, but this was hampered by the widespread "pilfering" of valuable Japanese medicines, supplies, and instruments by Navy medical officers from ships.[130] Much unnecessary ruination and spoilage of bandages and medicines was incurred by the wholesale looting.

Another medical facility for civilians was set up by two medical officers of the Civilian Affairs group and seven hospital corpsmen furnished by the Garrison Force commander.

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129. Ibid., p. 55.

130. Action Report, Com III Phib Corps, Marianas, p. 61.

Twenty volunteer native nurses assisted in the work. A native doctor also operated a civilian camp at Yona, performing very creditable service under the most primitive conditions.

The "comments and recommendations" sections of the Guam action reports reveal the strengths and weaknesses of the campaign. Commander Task Force 53 noted the failure of many ships to fly the Mike flag to indicate their ability to receive casualties. As a result, the numbers of wounded evacuated to the individual ships were disproportionate. The use of additional temporary medical personnel in the assault operation was praised, however.[131] A need for posting guards, preferably medical personnel, over medical property was expressed by the commander of the Third Amphibious Corps. In future campaigns, it was recommended that field hospitals be retained aboard ships until "sufficient beachhead has been secured and a suitable location for their installations been determined."[132] Sufficient cots, tents, blankets and medical supplies, it was felt, should be provided during the assault phase to care for civilian patients. The Third Marine Division received commendation for the excellent sanitary control measures it had put into operation, and the resulting low incidence of dysentery in this unit.[133]

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131. Action Report, USS WILLIAM P. BIDDLE, Guam; Action Report, ComTransDiv 8, Saipan-Guam.

132. Action Report, III Phib Corps, Marianas, p. 161.

133. Ibid.

The entire Marianas campaign represented a medical improvement over earlier Pacific campaigns. In view of the staggering problems of supply and organization, fanatical enemy resistance, and the character of the islands on which the fighting took place, the Navy Medical Department's work in the Marianas theatre was commendable. Whereas the individual phases of the campaign left something to be desired, the over-all picture was a satisfactory one. Reports on the Marianas campaign indicated ways of improving conditions and achieving better medical care for personnel participating in amphibious warfare. Unit commanders, group commanders, medical personnel and line officers offered frequent criticism in their reports, but only with the wish of eliminating as much suffering as possible from the horrors of war. Later campaigns were to prove the value of experience in the Marianas.

APPENDIX A

MARIANAS EVACUATION FIGURES

Action Report Headquarters Expeditionary Troops, Task Force 56, Marianas, 2 October 1944, p. 474.

A. Saipan and Tinian:

1. Hospital Ships.

Bountiful	(1st trip)	526
	(2nd trip)	522
Solace	(1st trip)	570
	(2nd trip)	543
Samaritan	(1st trip)	705
	(2nd trip)	505
Relief	(1st trip)	601
	(2nd trip)	680
	(3rd trip)	384
	TOTAL	5,036

2. Transports. 5,110

3. Air. 1,053

TOTAL 11,199

B. Guam:

1. Hospital Ships.

Solace	(1st trip)	581	
	(2nd trip)	500	(approximate)
Bountiful	(1st trip)	551	
	TOTAL	1,632	

2. Transports. 2,552

3. Air. 0

TOTAL 4,184

APPENDIX A

MARIANAS EVACUATION FIGURES

Action Report Headquarters Expeditionary Troops, Task Force 56, Marianas, 2 October 1944, p. 474.

C. Marianas Summary:

	Hosp. Ships	Transports	Air	TOTAL
Saipan and Tinian	5,036	5,110	1,053	11,199
Guam	1,632	2,552	0	4,184
GRAND TOTAL.....	6,668	7,662	1,053	15,383

APPENDIX B

STANDARD BLOCK MEDICAL SUPPLIES
(3,000 Men for 30 Days)

Action Report Headquarters Expeditionary Troops Task Force 56, Marianas, 2 October 1944, p. 476.

Item No.	Stock No.	Item	Unit	Required
		CLASS 1 - SUPPLIES (EXPENDABLE DRUGS, CHEMICALS AND BIOLOGICALS).		
1	1-110	ALCOHOL, ½ - ga. tin	tin	30
2	1-170	BISMUTH SUBCARBONATE, 1-lb. carton	ctn	7
3	1-175	BISMUTH SUBNITRATE, ¼-lb. bottle	bot	30
4	1-185	CALAMINE, PREPARED, ¼-lb. carton	ctn	10
5	1-325	ETHER, ¼-lb. tin	tin	60
6	1-495	MORPHINE TARTRATE, 0.032, gm., 1½cc tube w/sterile needle, t in pkg.	syrette	500
7	1-575	PETROLATUM, LIQUID, 1-qt., tin	tin	75
8	1-585	PETROLATUM, WHITE, 1-qt., can	can	60
9	1-775	SODIUM CITRATE, 2½% SOLUTION, 50 cc ampul, 6 in box	box	30
10	1-930	EMETINE HYDROCHLORIDE, 0.021 gm. 20 in tube	tube	18
11	1-980	ACID, ACETYLSALICYLIC, 0.324 gm. 1000 in bottle	bot	30
12	1-995	CODEINE SULFATE, 0.0162 gm. 100 in bottle	bot	30
13	1-1064	QUININE, 1000 in bottle	bot	36
14	1-1085	SODIUM CHLORIDE, 0.648 gm. 5000 in bottle	bot	30
15	1-1200	TINCTURE OF OPIUM, CAMPHORATED, 1-pt. bottle	bot	60

(Cont'd)

APPENDIX B

STANDARD BLOCK MEDICAL SUPPLIES
(3,000 Men for 30 Days)

Action Report Headquarters Expeditionary Troops Task Force 56 Marianas, 2 October 1944, p. 476.

CLASS 2 - SUPPLIES (EXPENDABLE) SURGICAL

16	2-090	BANDAGE, gauze, 2-inch	doz	60
17	2-095	BANDAGE, gauze, 3-inch	doz	60
18	2-105	BANDAGE, gauze, compressed, 2-inch one	one	300
19	2-110	BANDAGE, gauze, compressed, 3-inch, one	one	900
20	2-345	COTTON, absorbent, 1-lb. roll	roll	30
21	2-350	COTTON, absorbent, compressed, 1-oz. pkg.	pkg	210
22	2-355	CRINOLINE, 36-inches wide, 100 yd bolt	bolt	3
23	2-390	DRESSING, battle, large, one	one	600
24	2-395	DRESSING, battle, small, one	one	900
25	2-425	GAUZE, plain, 26 yd. roll	roll	30
26	2-545	MUSLIN, yard	yd	300
27	2-835	PLASTER, ADHESIVE, 2-in. by 5 yds., spool	spl	12
28	2-840	PLASTER, ADHESIVE, 12-in. by 5yds., roll	roll	30
29	2-845	PLASTER OF PARIS, 25-lb tin	tin	3
30	2-925	SPLINT, arm, hinged ring	one	10
31	2-940	SPLINT, leg, half ring	one	30
32	2-950	SPLINT, strap, adjustable, traction	one	40
33	2-955	SPLINT, strap and buckle	one	40
34	2-960	SPLINT, SUPPORT AND FOOT REST, combination	one	60

CLASS 6 - EQUIPMENT (NON-EXPENDABLE)
HOSPITAL AND NURSING

35	6-145	LITTER, metal pole	one	20

(Cont'd)

APPENDIX B

STANDARD BLOCK MEDICAL SUPPLIES
(3,000 Men for 30 Days)

Action Report Headquarters Expeditonary Troops Task Force 56 Marianas, 2 October 1944, p. 476.

CLASS 13 - SUPPLIES (EXPENDABLE) FIELD

36	13-095	FOOT POWDER, in 4-oz. sifter top tin	tin	300
37	13-175	SOAP, hand, cake	cake	60
38	13-200	TAG, diagnosis, 25 in book	book	30
39	13-215	TINCTURE GREEN SOAP, 3-oz, bottle in cont.	cont	30
40	13-225	ZINC OXIDE OINTMENT, 1-oz. tube	tube	60

CLASS S1 - SUPPLIES (EXPENDABLE) DRUGS CHEMICALS AND BIOLOGICALS

41	S1-070	ATABRINE, DIHYDROCHLORIDE	amp	500
42	S1-1000	GAS GANGRENE ANTITOXIN, combines	syringe	60
43	S1-2080	TETANUS GAS GANGRENE ANTITOXIN, combine	syringe	30
44	S1-2650	HYDROGEN PEROXIDE, 8%	bot	15
45	S1-3260	NEO-SYNEPHRIN HYDROCHLORIDE 1% sol. NNR 4oz. bottle	bot	6
46	S1-3280	NEO-SYNEPHRIN HYDROCHLORIDE 1% sol.	vial	7
47	S1-3361	OINTMENT, BAL	tube	300
48	S1-3365	OINTMENT, Butyn Ophthalmic, 2%	tube	60
49	S1-3375	OINTMENT , PROTECTIVE, 3oz. tube	tube	300
50	S1-3440	PENTROBARBITAL SODIUM, 500 in bottle	bot	1
51	S1-3450	PENTOTHAL SODIUM	amp	150
52	S1-3530	PLASMA, normal human, dried, 250cc	pkg	720
OR	S1-3531	PLASMA, normal human, dried, 500cc	pkg	360
53	S1-3670	QUININE DIHYDROCHLORIDE	amp	150
54	S1-3783	SODIUM SULFADIZINE	vial	25
55	S1-3790	SOLUTION, dextrose, 5% in Normal Saline, 1000 cc container, 6 in pkg	case	24
56	S1-3810	SULFANILZMIDE, POWDERED, $\frac{1}{4}$-lb	bot	30
57	S1-3813	SULFANILZMIDE, POWDERED, 5 gm.25-pkg.	pkg	120
58	S1-3991	BENZIDRINE SULPHATE, 6 in pkg	pkg	200

(Cont'd)

APPENDIX B

STANDARD BLOCK MEDICAL SUPPLIES
(3,000 Men for 30 Days)

Action Report Headquarters Expeditionary Troops Task Force 56 Marianas, 2 October 1944, p. 476.

59	S1-4011	APC - 100 in bottle	bot	30
60	S1-4021	ATABRINE - 1000 in bottle	bot	30
61	S1-4060	CARBASONE 0.25 gm. 20 in bottle	bot	180
62	S1-4335	SULFADIZINE, 0.5 gm, 500 in bottle	bot	30
63	S1-4337	SULFAGUANADINE, 0.5 gm. 1000 in bottle	bot	30
64	S1-4340	SULFANILAMIDE, 0.324 gm. 1000 in bottle	bot	10
65	S1-4380	SULFATHIAZOLE, 0.5 gm. 500 in bottle	bot	60
66	S1-4633	VITAMINS, multiple 100 in bottle	bot	300

CLASS S2 - SUPPLIES (EXPENDABLE) SURGICAL

67	S2-1550	SHEET WADDING 32" x 6 yds piece	24 pkg	2

CLASS S13 - SUPPLIES (EXPENDABLE) FIELD

68	S13-450	INSECT REPELLENT, liquid	2-oz bot	6000
69	S13-451	INSECTICIDE POWDER	"	1500

APPENDIX C

TINIAN HOSPITALIZATION ASHORE

Action Report Transport Quartermaster's Report, Tinian, 10 August 1944, p. 686.

DATE	2nd MARDIV (2 Med Co.'s)		4th MARDIV (2 Med Co.'s)		TOTALS	
	Cap.	Occ.	Cap.	Occ.	Cap.	Occ.
JIG-Day) July 24) J/1 - 25	Data not available for this period.		Data not available for this period.		Data not available for this period.	
2 - 26						
3 - 27						
4 - 28						
5 - 29						
6 - 30	280	133	60	20	340	153
7 - 31	325	201	76	9	401	210
Aug. 1	336	276*	76*	76*	412*	352*
J/9 - 2	337*	181	66	14	403	195
10 - 3	325	76	35	14	360	90
11 - 4	162	76	35	10	197	86
12 - 5	155	80	50	46	200	126
13 - 6	155	92	50	42	205	134
14 - 7	155	71	50	25	205	96
15 - 8	155	83			155	83
16 - 9	155	87			155	87
17 - 10	155	107			155	107
18 - 11	155	137			155	137

* Denotes peaks.

NOTE: Control of 2nd MarDiv passed to IsCom on 10 August 1944.

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THE CAROLINES

CHAPTER IX

THE CAROLINES

South of the Marianas there is spread over the Pacific a widely disseminated group of islands known as the Carolines. These, formerly called Spanish Micronesia, had been secured by Germany in 1885, and had passed as mandates to Japan following the first World War. Largest and most heavily fortified of the Carolines, the great Japanese naval base of Truk, was by-passed in assault landings -- though its striking power was nullified by air and carrier raids. The Carolines as a group, however, were a necessary step in the Navy's stride across the Pacific to the Philippines and, eventually, to Japan.

Section 1. The Southern Palaus

The first objective of the Caroline campaign was the Palau group, almost 1,200 miles west of Truk. Of these islands, Peleliu and Angaur in the southern section were selected for the major landings. In March of 1944 a heavy task force raid had delivered a powerful bombardment at the Palaus with material damage to the Japanese installations.[1] September 15th was set as the invasion date for the first attack. Peleliu was the object, and the Third Amphibious Corps, with the First Marine Division and the 81st Army Infantry, was prepared

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1. Lt. Oliver Jensen, USNR, Carrier War, p. 122.

in Hawaii and the Russell Islands for the assault operation.[2]

Over-all Military Operations

The conquest of the Carolines was considered with care, as the Japanese had had six months in which to strengthen their fortifications. Peleliu with its narrow coral reefed beaches had no harbor or even a suitable anchorage. In addition, the logistic support for any campaign against the Palaus presented great difficulties.[3] As scheduled, however, on the morning of the fifteenth, the assault troops of the First Marine Division landed on the Peleliu beaches. They had been immediately preceded by a heavy naval and air bombardment. A beachhead was secured fairly rapidly, although the Japanese had mined the approaches. In the beginning, little opposition was met, and by the night of 16 September the American forces had captured the Peleliu airfield.[4] In view of the swift initial progress, the 81st Infantry Division, which had supported the First Marines, was released for the capture of nearby Angaur. On 17 September the 81st Infantry landed on Angaur, bomber airfield site of the Palaus. Calm seas permitted the landing of troops and supplies "with the precision approaching that of a training exercise." Opposition was light and organized resistance

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2. The Third Amphibious Corps was commanded by Maj. Gen. R. S. Geiger, USMC; The First Marine Division, by Maj. Gen. W. H. Rupertus, USMC; and the 81st Infantry Division, by Maj. Gen. Paul J. Meuller, USA.

3. Action Report, Commander Amphibious Group V, Peleliu, p. 11.

4. Action Report, Commander Third Fleet, Seizure of the Southern Palaus, p. 8.

had ceased by 20 September.

Meanwhile the Peleliu operations had run into difficulties. To the rear of the beaches, on the north-south "backbone" of the island, were a series of tunnelled cave positions which the Japanese defended with tenacity. It was found virtually impossible to place artillery fire or direct bomb hits on these sites, and harassing sniper activities and infiltration moves hampered all movements of the American forces. On 23 September it became necessary to return a regimental combat team of the 81st Infantry Division to support the attack on the rocky, wooded, cave fortress. Flamethrowers, demolition teams and infantry assault gradully cleaned the area cave by cave, and on 30 September the Commander Task Force 32 announced the capture and occupation of the southern Palaus. Marine and infantry forces had secured adjacent small islands in the group, and although considerable mopping up of isolated units on both Peleliu and Angaur remained to be done, the campaign was officially concluded.[5]

Medical Planning and Organization

"Medical planning", stated the records, "was in accordance with directions from higher authority and with S.O.P., and based upon experience gained in previous operations."[6] Medical companies were increased three to five percent above Table of Organization strength. Corpsmen for the infantry battalions were increased from 32 to 40 per battalion, permitting the use of two men per platoon.

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5. Some resistance on Peleliu continued until 27 November.

6. Action Report, 1st MarDiv, Palau Occupation, p. 112.

In the First Marine Division, 32 men were assigned to each battalion as stretcher bearers. Such advanced assignment, it was found, had materially improved the morale of the fighting forces.

With the First Marine Division were its regimental and battalion medical units supplemented by its medical battalion and a malaria control unit and sanitary organization. The 81st Infantry Division carried its own organic medical units to which were added the 17th Field Hospital and the 41st Portable Surgical Hospital.[7]

The Landings

The approaches and beaches to both Peleliu and Angaur had been heavily mined. In addition, at Angaur, the Japanese had wedged projecting railroad ties into the coral bottom to prevent vehicular passage. Shortly before the landing, underwater demolition teams succeeded in clearing many of the mines. Other mines on both Peleliu and Angaur fortunately proved to be inert. Bulldozers landed early and successfully cleared away the remaining obstructions.[8]

It proved impossible to land the medical companies early, and casualties were treated in the beach evacuation centers manned chiefly by the medical beach parties from the transports. As in earlier operations, treatment consisted of emergency first aid, no

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7. Action Report, Commander III Phib Corps, Palaus, p. 125.

8. An interesting medical aspect of the underwater demolition team was the successful use of three drops of 2 percent salicylic acid in tincture of merthiolate to prevent fungus infections in the ears of the swimmers. (Action Report, Commander Underwater Demolition Team, Angaur, p. 8.)

definitive procedures being employed. On D plus 5, medical companies were able to land at Peleliu and set up more extensive facilities.

At Angaur, on Blue Beach, for example, medical beach parties from the USS SUMTER and the USS CALLOWAY divided the care and evacuation of casualties from 17 September to 21 September, when they were relieved by the Army shore party. During this period medical personnel of the SUMTER and CALLOWAY operated two stations on the beach, and to these were brought the wounded from the more advanced areas. Close liaison was maintained between the two stations , and temporary shortages of supplies at one were remedied by the other. Of the patients treated by the medical party of the SUMTER, less than half were incapacitated by direct enemy action. Accidental wound fragment cases, minor coral cuts, sunburn, chafed skin, sore feet, and other illnesses made up the remainder. The practice of setting up a can of water, cooled by burlap wet with sea water, and a bottle of salt tablets for the use of all persons passing the station was found to be desirable.[9]

Evacuation

During the early hours of both the Peleliu and Angaur campaigns, the real arbiter of the efficiency of any "beach treatment" is the speed and skill with which casualties are evacuated. Angaur evacuations were conducted more smoothly than those at Peleliu, but both were advancements on earlier campaigns. There were, of course,

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9. Action Report, USS SUMTER, Angaur, pp. 23-26.

fewer casualties at Angaur, permitting more time and individual care per casualty. In both campaigns, the medical department had improved its chain of evacuation to include the benefits of the Marianas experiences.

The combination of Army and Marine forces provided another opportunity to observe the effectiveness of the various land evacuation vehicles used by the medical personnel of both organizations. The Army quarter-ton truck was found valuable for ambulance purposes by both Army and Navy personnel.[10] It was said to supply maximum comfort and least transportation shock to the patients. Similar consideration of the Army M29C semi-amphibious tracked vehicle resulted in the belief that mechanical imperfections and rough riding qualities minimized its value. The Dodge ambulance, however, had proved consistently to be the best all-round field ambulance.

Land evacuation on both Angaur and Peleliu was rendered especially difficult by the rough terrain of the main combat zones. Rocky cliffs sometimes as high as one hundred feet necessitated the lowering of casualties in Stokes litters by means of ropes and pulleys.

On the beaches, DUKW's again were praised as the best amphibious evacuation vehicle. A storm arose on Peleiu as the campaign progressed, and it was noted that when all other boats were unable to reach the beaches, DUKW's ploughed through with supplies

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10. Action Report, Commanding General 81st Infantry Division, Angaur, p. 146; Action Report, Commander III Phib Corps, Palau, p. 126.

and, on return trips, with casualties. Recommendations were made by the Commander Third Fleet that increased supplies of these vehicles be made available for future operations in similar terrains.

The amphibious vehicles were met at the reef by both LST's and LCVP's for further transport to the APA's and hospital ships. The LST's were staffed with medical personnel. During the calm weather, use of a ramp at the Peleliu reef permitted LVT's and LCVP's to transfer casualties to the LST's with a minimum of discomfort to the wounded. During the day, first aid was rendered aboard the LST's after which the casualties were transferred to the transports for more definitive care. This, stated the commander of LST Flotilla 13 at Peleliu, was the "most efficient (system of handling casualties) yet seen in which LST's were involved."[11] It would not have been practicable , however, he admitted, in any other than a smooth sea. During the night of the seventeenth LST 225 was designated as a casualty transfer ship for one of the beaches, and it was stationed 1,500 yards off the Peleliu shore. Over the bow was hung a blue light to identify the ship for the small boats bringing the casualties from the beach. This feature worked well at the Peleliu beaches, and eliminated much confusion.[12]

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11. Action Report, Com LST Flotilla 13, Peleliu, p. 5.

12. Action Report, USS LST 225, Peleliu, p. 2.
During the day transports and LST's flew the Mike flag when they were able to take casualties aboard. Not all the LST's were blue-lighted at night, and there are indications in the reports that considerable confusion in evacuation resulted off some beaches because of this absence of properly identified aid ships.
USS WAYNE, Peleliu p. 17.

Further efficiency was achieved by establishing a medical officer at the reef's edge to determine the severity of injuries, furnish medical attention, and facilitate handling. These officers with their staffs were known as "Reef Beach Medical Sections" and were a new and valuable feature of the chain of evacuation.[13]

One of the most valuable vessels for the evacuation of casualties at Peleliu was the transport. Hospital ships were available on D plus 3, D plus 6, D plus 7 and D plus 9, but the transports played a major role in giving definitive treatment and evacuating during the periods the AH's were not present at the beaches. At Peleliu, less than an hour after the troops made the initial landing, casualties were being received aboard the transports. The USS FAYETTE's senior medical officer made an interesting survey to determine the time lapse between injury and receipt aboard the APA. One hundred casualty histories of those aboard the FAYETTE were picked at random and the time computed. Of these, four-fifths were wounded in the day time. Taking the interval between 0700 - 1900, the average length of time between the period of injury and receipt on board was 2 hours and 53 minutes; the shortest, 30 minutes; the longest, 13 hours. At night, the average lapse of time was 7 hours and 17 minutes.[14]

Over-all statistics on the types of casualties evacuated

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13. Action Report, USS FAYETTE, Caroline Campaign-Peleliu, p. 10; ComTransDiv 6, Peleliu, p. 11.

14. Action Report, USS FAYETTE, Peleliu, p. 14.

during the Peleliu or Angaur operations have not been compiled. Samplings, however, can be secured from the individual reports of APA's present at the operations. The FAYETTE, classified its 302 casualties as follows:

Missile Wound	64%
Blast	13%
Other Injury	6%
Heat Exhaustion	6%
Neurosis	6%
Sick	5%

The majority of the missile wounds affected the upper extremities, 14 percent being head wounds.

Treatment aboard the evacuating transports was carried out by specialized teams. The use of whole blood transfusions was recorded again and again on board the transports. The USS LEONARD WOOD at Angaur, the USS WAYNE at Peleliu, the USS LEON at Angaur, the FAYETTE at Peleliu, and many other APA's cited the value of the whole blood transfusions. The FAYETTE had established a blood bank of 28 quarts from volunteer "O" type donors, and drew over nine quarts more in cases where time permitted of cross matching. Supplies of penicillin were more ample then during the Marianas campaign and the transports reported that it was used in all "desirable" cases.[15]

In most instances, facilities of the transports seemed adequate except for the feature of poor ventilation of sick bay quarters. On the USS ORMSBY the temperature of the operating room varied from 98 to 102 degrees Fahrenheit. Medical officers on the

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15. Ibid.,p. 15. Also see USS LEONARD WOOD, Angaur, p. 8; USS WAYNE, Peleliu, p. 25; USS ORMSBY, Peleliu, p. 8.

LEONARD WOOD found the same difficulty. With the average temperature over 100 degrees the FAYETTE reported, "It is the opinion of the medical officer that such temperatures are definitely detrimental to the progress of the patients confined, particularly when it is borne in mind that casualties are brought aboard in a state of extreme dehydration and fatigue."[16]

In addition to the evacuation facilities of the transports, four hospital ships were used in the Peleliu-Angaur campaigns - the SAMARITAN, BOUNTIFUL, SOLACE and RELIEF. Despite the recommendations of the staff medical officer and surgeon of the Third Amphibious Corps that the ships arrive on D plus 2, D plus 4, D plus 5 and D plus 7 respectively, the over-all plan provided for their arrival from one to two days later.[17] Post operation comments on the Palaus by the Commander Third Fleet contained the statement, "The early arrival of hospital ships is important to furnish better care of the wounded than can be provided on the AP's, and they should be brought in at the earliest practicable date."[18]

It is true that the majority of cases carried by the hospital ships had already been processed by the transports and other agencies. This limited the excellent facilities provided by the

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16. Action Report, USS FAYETTE, Peleliu, p. 16.

17. Action Report, ComPhibGrp 5, Caroline Invasion, p. 227.

18. Action Report, Commander Third Fleet, Palau Operation, p. 3. This was emphasized even more firmly by Com III Phib Corps who recommended that the AH's arrive the afternoon of D-day.

AH's and cast them primarily in the role of evacuation vessels and floating ambulances. On D plus 3 the USS SAMARITAN was loaded with 607 processed cases from the transports, and she departed within seven hours of her arrival. The USS BOUNTIFUL, on D plus 6, picked up 550 processed cases in five hours and sailed out again. The USS SOLACE and USS RELIEF remained outside the Peleliu reef for several days. On D plus 15[19] the RELIEF departed carrying 685 patients, some of whom were fresh battle casualties.

In the ten-day period before the medical companies were able to set up facilities on land, a total of 3,756 casualties were evacuated from Peleliu. Most of these had been carried by the transports. At Angaur, the hospital facilities were set up earlier, on F plus 2, and much of the work done on the Peleliu transports was accomplished by the hospitals on Angaur before evacuation. A total of 5,554 casualties was evacuated from the Palau Islands via water and 258 more by air during the period 15 September to 14 October 1944.[20]

Reef conditions off the beaches of Peleliu had been as difficult a natural barrier to evacuation as any hitherto found. Yet the Commander of the Third Amphibious Corps was able to state in his report on the Palau campaign that "on the whole the evacuation

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19. D-day was the designation used for the Peleliu invasion, F-day for the Angaur invasion date.

20. Action Report, III Phib Corps, Palau, p. 127.

of casualties was carried on in a highly satisfactory and efficient manner".[21] Medical officers and line officers had combined to eliminate as far as possible the defects and weaknesses of previous campaigns.

Hospitalization

On Peleliu, the severe Japanese mortar and artillery fire from Bloody Nose Ridge commanded any location where hospital facilities could be set up. Not until D plus 8 had this factor been sufficiently eliminated by the assault forces to permit the general setting up of field hospital facilities. As a consequence, in the early phases of the campaign, personnel of the medical companies were used for collecting casualties on the island and for replacement of medical personnel of the combat teams.[22] By D plus 5, Medical Company A had installed some facilities on White Beach.

At Angaur, the situation was somewhat better. Here the 17th Field Hospital and 41st Portable Surgical Hospital set up operation by F plus 2 days and began receiving patients immediately. Both the Angaur and Peleliu hospitals during the assault phase were operated chiefly as evacuation hospitals, and were especially valuable during the night when it was impossible to evacuate satisfactorily to the ships. The 41st Portable Surgical Hospital was a 300-bed facility, but the 17th Field Hospital, with the requisition of 100 beds and equipment from the SOLACE, provided care for 600. This field hospital

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21. Ibid., p. 126.

22. Action Report, 1st MarDiv, Palau Occupation, p. 115.

was used as an air evacuation unit, at the end of the campaign. Other hospital facilities on both Angaur and Peleliu, which were to be used to receive casualties from later Pacific campaigns, were established after the official cessation of hostilities in the southern Palaus.

An item for which there had been considerable need in previous campaigns was an easily-set-up, prefabricated operating room. These were welcomed at Peleliu and Angaur and proved "very satisfactory". It was recommended that the windows be covered with black, instead of green, cellophane material, and that additional ventilation be provided for tropical use.[24]

Casualties

The new phase of warfare of withdrawing to more defensible inland positions,[25] as initiated by the Japanese at the Palaus, had no effect upon the final outcome of this and later Pacific campaigns, but added heavy tolls to the American casualty lists. Commensurate with the amount of ground gained, the casualties were high. In the veteran First Marine Division, which received the brunt of the enemy's powerful defense fire, 46 percent were casualties - killed, wounded

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23. Action Report, 81st Infantry Division, Palau Operation, p. 113; Action Report, III Phib Corps.

24. Action Report, 1st MarDiv, Palau Occupation, p. 15.

25. The enemy change in tactics was marked by a withdrawal of troops from the water's edge, and establishment of the bulk of infantry in tunnels, caves, and pockets in the rocky hills. From these positions the previously mined beaches were defended with mortar and artillery fire. No longer was strength wasted on Banzai attacks.

and missing in action.[26] Losses among medical personnel were especially high, due to their continual exposure in an effort to aid the wounded. Frequently enemy snipers would wait until aid men reached the wounded before firing. The following table from the action report, Commander Third Fleet, lists American personnel losses in the Palaus:

	Killed	Wounded	Missing	Total
1st Marine Division	842	4,063	126	5,031
81st Infantry Division	233	1,664	114	1,911
Island Command, Peleliu	22	169	6	197
	1,097	5,896	246	7,139

Japanese losses of 10,449 killed on Peleliu and 1,192 on Angaur were also a silent testament to the cost in lives of the Palaus campaign.

Medical Supply

Medical supplies for a 30-day period were carried by both the 81st Infantry and the First Marine Division, and were found to be adequate and of good quality. Ship to shore supply in the early stages worked fairly well except for temporary shortages, in the shore party medical section, of paregoric, plaster bandages, plywood splints, sulfadiazine and ethyl alcohol.[27] Transports and hospital ships furnished replacements of these items, although some medical officers aboard ships criticized the requests from the shore which asked for "all available" supplies of some item. It was felt that more specific requisitions would better have met the situation.

No shortages of antitoxins occurred among forces ashore or in transports. While clothing was available for the injured aboard the

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26. Action Report, Commander Third Fleet, Palaus Invasion, p. 5.

27. Action Report, ComPhibGrp 5, Caroline Invasion, p. 228.

transports, it was felt that some clothing supplies should be available to the medical battalions ashore to evacuate patients in more presentable covering than the soiled, torn, frequently bloodsoaked uniforms. This was more particularly emphasized where patients were evacuated by air, no other stores of supplies being provided here as on the transports.[28]

A variety of comments on supplies of food available to the medical units was reported. C and K rations were the standard supplies, and were available in adequate amounts. Their value, however, was impaired by mold formations on the biscuits. Some of the aid stations were supplied by the transports with hot cooked food, and it proved a valuable and welcome addition to the cold rations. Special convalescent rations were available in limited quantities, and were pronounced "very satisfactory" where used.[29] From the standpoint of health and sanitation, cold rations were far better than hot cooked food prepared under unsanitary conditions during the combat stages of the campaign. Field kitchens were not set up until sufficient facilities were available for boiling water to sterilize mess gear. A request for an adequate supply of coffee and an apparatus for heating it to be used in aid stations, was submitted in the Palau campaign.[30] Hot coffee was felt to be almost as necessary as some medical supplies, especially in the forward areas.

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28. Action Report, 1st MarDiv, Palaus, p. 113.

29. Action Report, III Phib Corps, Palau, pp. 125-126.

30. Action Report, ComGen 81st Infantry Division.

It had been believed that there were few, if any, natural sources of water on Peleliu and Angaur, although it was thought the Japanese had some water storage facilities. In addition to the standard water trailers and water cans, the First Marine Division cleansed, steamed and filled 3,000 gasoline drums to provide two gallons per day per man for five days.[31] Similar provisions were made in the 81st Infantry and in both units sufficient evaporators and purification units were embarked. After the landings it was found that water could be drawn from shallow wells along the beaches. Japanese wells were also available further inland, and they were used following the cleaning and establishment of a purification unit. From these combined sources sufficient water was made available, a maximum output of 86,700 gallons being reached. This was an average of three gallons per man, per day.

The over-all medical supply situation on Angaur was a good one. The Commander Third Amphibious Corps reported the supplies and equipment to have been "of excellent quality and ... provided in adequate amounts".[32] Notable improvement had been made over medical supply conditions in the Marianas.

The Medical Department and Civil Affairs

Very few civilians were encountered on Peleliu, the Japanese having previously evacuated them. The thirteen civilians that the First Marine Division took into custody were sent to Angaur shortly

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31. Action Report, 1st MarDiv., p. 117.

32. Action Report, III Phib Corps, p. 11.

after their capture. On Angaur the bulk of the Palau civilians, over 1,000 in number, had been collected. Contrary to previous Pacific island campaigns, detailed planning was drawn up for the care and medical attention of the civilian population during the assault period. Emergency supplies of food, water and clothing supplemented the medical supplies of the 81st Infantry Divisional surgeon who treated the wounded and ill on Angaur.[33]

The question of medical aid to enemy civilians in the Palaus was simplified by the comparatively small number present. In no instance were the problems truly comparable to the care of civilians in the Marianas campaign because of the great difference in population figures. The work that was done among the enemy civilians in the Palaus reflects favorably on the Navy Medical Department.

Sanitation

Reports on the sanitation conditions in the Palaus tend to be conflicting. The commander of the Third Amphibious Corps stated that sanitation in both the forward and rear areas of the First Marine Division was "extremely poor", while the 81st Division (largely on Angaur) had "shown good training and discipline in regard to sanitation."[34] Yet a medical officer present at Peleliu on 28 September wrote Admiral McIntire, "The sanitation has been something new in the annals of tropical island fighting or in military hygiene anywhere. At least, up to

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33. Action Report, ComGen 81st Infantry, Angaur, pp. 114-115.

34. Action Report, III Phib Corps, Palau, p. 128.

the present we have it all under control including the fly and mosquito control."[35] The fact that makes both statements more consonant is that despite widespread, poor sanitary conditions, there were negligible numbers of casualties resulting from these conditions. The situation was, as the commander of the Third Amphibious Corps phrased it, "remarkable." The commander of the First Marine Division echoed the sentiment: "For the first time in the history of Military Operations, there has been practically no illness that could be attributed to flies or mosquitoes. This could not be the results of sanitary measures by individual organizations".[36]

Flies were especially abundant on Peleliu. Piles of rotting Japanese food bred many; others thrived in unsanitary latrine facilities, dead bodies, and waste food. Very few flies were present at the time of landing, but there was a steady increase up to D plus 25, when strenuous control methods finally effected a gradual reduction.[37] The unsanitary factors that favored the heavy fly breeding were no deterrent to the breeding of mosquitoes. Both Aedes aegypti and albopictus were reported on Angaur. Peleliu, however, supported no Anopheline or Aedes aegypti, although the swamps and wooded areas north of the airfield fostered the growth of Culicinae mosquitoes.

The Palau Islands, like the Marianas, were relatively malaria free and there was a very low incidence of this disease during the

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35. Surgeon General's Files, "Excerpt from Personal Letter of Medical Officer, Peleliu", 28 Sept. 1944, n.p.

36. Action Report, 1st MarDiv, Palau Occupation, p. 115.

37. Ibid., p. 116.

campaign. The 81st Division as a whole had never been exposed to malaria, and reported only seven cases - none ill enough for evacuation. Previous operations of the First Marine Division in the malarious regions of the Pacific had heavily "seeded" the personnel with malaria. Suppressive treatment had been required for seven days prior to D-day, to the extent of three atabrine tablets per day, and this was continued in the Division throughout the campaign as far as military exigencies permitted.[38] From 24 September to 1 October, 72 persons were hospitalized from the First Marine Division with recurrent malaria. Only 4, however, were evacuated, and for the most part the other 68 required only a few days' of hospital care.

Against the numerous flies, mosquitoes, and gnats was brought to bear a new weapon of medical sanitation - DDT. Penite (sodium arsenite) had been the agent used in previous campaigns to control fly and mosquito breeding, and considerable success had been achieved. The chief drawback, however, was that Penite produced many cases of arsenical dermatitis, and necessitated great care in using.[39] Some experiments with DDT had been carried out at Guadalcanal and at Pavuvu, but the Palaus campaign was the first in which widespread use of the new formula was made.

Three sanitary squads of 15 men each were organized, trained, and equipped for the expedition. Each squad carried ten knapsack sprayers

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38. Action Report, III Phib Corps, Palau, p. 129.

39. Action Report, 1st MarDiv, Palaus, Annex D, p. 30.

and DDT mixed with Diesel oil. Nets and jungle hammocks were treated in advance with a kerosene solution of DDT. In addition, a power sprayer carried on a truck was installed by malaria control personnel. The squads landed on D-day, and despite the loss of some of their equipment, began functioning immediately, following the combat teams. They sprayed dead bodies, sprayed ruined food supplies, straddle trenches, latrines and pools, and any other sources of insect breeding. Spraying of DDT by airplane was instituted about D plus 12. At the same time a power truck for spraying was landed. The sprayers had a difficult task at both Peleliu and Angaur. Large areas of swamp land and mud flats left by receding tides made the task difficult. In addition, many sources of fly breeding could not be reached with the DDT spray -- thousands of enemy dead hastily buried in shallow graves, thousands more rotting in the open beyond the front lines. Enemy fire prevented even plane spraying in many spots during the combat stage of the occupation.

The use of DDT was effective in the long range sanitation program for the Palaus, but its immediate results were not too obvious. Adult flies were successfully destroyed by the solution, but the larvae were unharmed. The consequence was that the flies bred more rapidly than they could be destroyed. After D plus 25, however, results were noticeable. The factor most significant in reducing the fly population was the plane spraying, which according to the commander of the 81st Infantry, "made the largest single contribution toward the complete control of the fly problem."[40]

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40. Action Report, 81st Infantry Division, Peleliu, p. 113.

Seven elements were considered in the program of the medical and sanitation officers in the Palaus: elimination of fly breeding areas, initiation of over-all insect control program, establishment of adequate measures for garbage and trash disposal, correction of unsanitary mess and galley practices, coordination of medical facilities, control of water supply and establishment of sanitary practices in heads. Many of these aims were not fulfilled until after the active combat stage of the operation had passed. Unquestionably, the climate and terrain presented unusual difficulties to any program of sanitation.

The real answer to the low incidence of serious disease in an area where the sanitation as practiced left much to be desired was simply that no tropical diseases were endemic on Peleliu or Angaur. Gastro-enteritis and fungus infections of the skin did result from the lack of proper sanitation.[41] But the wave of dengue fever and malaria that had put thousands of American troops out of action in earlier campaigns never materialized.

The commander of the III Amphibious Corps reported at the conclusion of the Palau campaign that "from a medical standpoint this has been one of the most satisfactory and successful of any of the operations in which units under the command of this corps have participated."[42] He attributed the success to careful planning and training, "to the

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41. Letter from Group Medical Officer, Marine Aircraft Group 11, to the Chief of the Bureau of Medicine and Surgery, 23 Nov. 1944, n.p.

42. Action Report, III Phib Corps, Palau, p. 130.

evaluation and utilization of lessons learned in previous combat operations, and to the splendid and wholehearted spirit of cooperation and coordination of all Army, Navy and Marine units involved." Profiting from past experiences, the Navy Medical Department made many improvements in planning and operation of the various medical phases of the operation which showed worth-while results.

Section 2 The Ulithi Islands

The occupation of Ulithi some 500 miles north of the Palaus was the third step in the invasion of the Carolines. Five main islands of the group in the Ulithi lagoon were the objects of the American landings: Sorlen, Falalop, Asor, Mogmog, and Potengeras. To this task one of the RCT's of the 81st Infantry was assigned. The story of Navy medical activities at Ulithi is a limited one, first because the campaign was primarily an Army affair, and secondly, and most important, because the islands were not defended by the Japanese. Mine fields had been extensively laid about the area, and the only casualties from the campaign resulted from a minesweeper's striking an enemy mine.[43]

The American forces landed on the five Ulithi Islands on 23 September. From the appearance of the islands the Japanese had left at least a month previously. The natives, who were friendly to the American forces, confirmed this belief. Gunfire from the invading forces accounted for a few casualties among the natives, and most of these were treated by medical elements of the RCT. One of the wounded

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43. Action Report, Com III Fleet, Seizure of the Southern Palaus, p. 8. Nine men were killed and 13 wounded when the YMS 385 sank on 1 October while minesweeping was in progress.

was the daughter of the Chief of Ulithi Atoll who was severely injured by shrapnel. Although she was carried to the USS HARRIS for surgical treatment by the ship's medical officer, she expired.[44] Feeding the 325 natives of the atoll was also carried out by the RCT personnel. Later Navy Civil Affairs personnel handled the removal of the natives and their effects to a reallocation center on one of the islands.

Sanitation among the natives was primitive, but no serious tropical diseases were endemic. Cases of ulcers, some cachexia, and occasional indications of anterior poliomyelitis were noticed on some of the islands, but there was no malaria or dengue.

The capture of Ulithi, in conjunction with the seizure of Angaur and Peleliu Islands, extended the line of American bases which was to effect an isolation of Japanese holdings in the Central and South Pacific.

Section 3. The Caroline Battle Afloat

Prior to the landings on the Palaus, powerful sea and air strikes had been directed first at Truk, and then at the Palaus. These strikes constituted an important part of the Pacific battle afloat. Not until the Philippine campaign were the Japanese suicide planes organized to conduct a form of warfare that in these later operations was to constitute a serious menace to the fleet. During the Caroline campaign, enemy shore fire, enemy torpedo hits, and bombs from Japanese planes, however, were frequently of considerable effect in providing medical

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44. Action Report, USS HARRIS, Palau-Ulithi, p. 8.

and surgical care aboard the American line vessels.[45]

Hospital ships and hospital equipped APA's did not take part in the raider actions of the line vessels; consequently medical care had to be provided on the war vessels themselves. The size of the ship, of course, in large part determined the extent of medical facilities and number of medical personnel attached to the vessel. Frequently, when smaller vessels sustained large numbers of personnel casualties, they would be transferred to battleships or aircraft carriers, where they could receive more adequate treatment. At Truk, in the raid of 29 April 1944, the destroyer USS TINGEY (DD539) was struck and sustained 22 casualties. Many of these were in serious conditions and were transferred to the nearby USS BUNKER HILL for medical treatment.[46] A major cause of many of the fragment injuries, the TINGEY medical officer pointed out, was the failure of many of the men to wear their kapok jackets and helmets.

The increasing significance of air power in the Pacific campaigns led to an elaborate program by the Navy Medical Department for the care of the injured pilots and the psychological care of all pilots. At the Caroline strikes, these measures proved of great value. On the BUNKER HILL, for example, a careful arrangement was worked out by the

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45. Action Report, Commander Third Fleet, Seizure of the Southern Palaus, p. 19.
Return American fire from the fleet sea and air arms, nevertheless, reached a new high in destructive power. Japanese losses at the Palaus mounted to the staggering totals of 1,901 planes hit; 222 large vessels sunk; 333 vessels (excluding small craft) damaged or probably sunk, and 11,637 enemy personnel killed.

46. Action Report, USS TINGEY, Truk, p. 21.

medical department to permit prompt medical assistance to wounded personnel in returning planes without interfering with the landing operations aboard ship. Medical personnel were stationed at strategic points on the ship for this purpose: (1) forward on the flight deck, were stationed 1 dental officer and 3 hospital corpsmen; (2) in the status board compartment of the island structure were located 1 medical officer and 1 corpsman; (3) at the flight deck emergency battle station were to be found the flight surgeon and 2 corpsmen; (4) on the hangar deck 1 dental officer and 2 corpsmen were stationed at number two plane elevator; and (6) 2 corpsmen were located at number three elevator. Therefore, wherever aviation personnel in need of medical assistance landed, medical assistance was immediately available. Seriously wounded were removed from the parked plane and sent directly to sick bay by stretcher bearers.[47] This distribution of medical personnel was also maintained during general quarters, and was assumed upon order of the captain when the ship was engaged by the enemy.

During the strikes on Truk the morale and general efficiency of the flight personnel were the particular concern of the medical officers, and on the whole, excellent results were achieved. Few cases of nervous disorder were seen, and during the times the carriers were under fire only a moderate degree of tenseness was evident.[48] Flight surgeons and senior line officers established a policy of anticipating worries of the pilots. Fear of capture was more real to most of the

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47. Action Report, USS BUNKER HILL, Palau, p. 19.

48. Action Report, USS INTREPID, Truk, Medical Report, n.p.

pilots than fear of death or injury. Truk, where all of the objectives were well inside of the surrounding reef, held considerable possibilities of capture. Therefore, in preparing pilots for the task, the object of the strike was kept secret until reports of the enemy's weakened power at the objective had been outlined with the use of reconniassance photographs. Stressing of rescue facilities and excellent American medical facilities was a part of the program of minimizing the normal fears of the men who piloted the Navy planes.

In relation to other Pacific campaigns, the Caroline invasions were less costly in personnel losses. This improvement was in part due to the smaller numbers of American troops employed in the engagements. The Caroline operations marked, however, the introduction of a new and tenacious form of warfare which the enemy was to perfect at Iwo Jima and Okinawa. In these later campaigns the use of heavily defended tunnels, caves, and wooded ridges was to account for thousands of American lives. Commensurate with the amount of territory involved, the Japanese were able to inflict severe personnel losses upon the two American divisions employed in the Palau occupation. Some medical aspects of the Pacific campaign had been notably improved. Evacuation functioned more smoothly; shortages of medical supplies were at a minimum. Sanitation during the combat stages left something to be desired, but, fortunately, disease incidence was low. With the occupation of the Palaus and Ulithi and the effective elimination of Truk as a serious menace, the American forces were ready for the next goal, the capture of the Philippines.

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CHAPTER X

THE PHILIPPINES

By the fall of 1944 the American forces had succeeded in establishing bases for the long awaited return to the Philippines. For almost three years most of 7,083 islands of the archipelago had been controlled by the Japanese, and the original American defenses had been rebuilt and expanded into a formidable area of Japanese military strength. For the task of reoccupying the Philippines a great American Army and Navy force was mobilized in the largest joint operation of the Pacific war. The Seventh Fleet was augmented by the major part of Pacific Fleet Task Force 31, including almost all the amphibious craft then available in the Pacific area.[1] Army forces under the command of General MacArthur were readied for the first landings in the Philippines, on Leyte Island.

Section 1 Leyte

In September, Third Fleet carrier planes had participated in heavy raids against Philippine installations, at Manila, Luzon and the central Philippine islands. The first invasion date was set for 20 October, and the east coast of Leyte Island was chosen for the attack. Leyte was especially suitable for the first Philippine operation inasmuch as it commanded the approach to Surigao Strait, giving access to the central Philippines. The east coast of the island was undefended from the east and provided good anchorage area. The chief

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1. Action Report, Com III Phib Force, Luzon, Lingayen Gulf, p. 3.

disadvantage to the operation lay in the time of year--for the monsoon with its accompanying drenching rains lasted from October to March, and was an obstacle to any military operation.[2]

Two forces were to be employed for the Leyte invasion--the Northern Attack Force (Seventh Amphibious Force) under Vice Admiral Barbey, and the Southern Attack Force (Third Amphibious Force) under Vice Admiral Wilkinson. In all, over 650 ships were employed, and four Army divisions were to be landed on the Leyte beaches on A-day.[3] Rehearsals were conducted at Maalaea Bay, Maui, and on the island of Kahoolawe in early September. In early October the forces underwent further training and logistic replenishment at Manus and Eniwetok.

Embarkation

On board the transports, immunization against cholera, typhus, and plague was administered to Army and Navy forces under direct order from Cincpoa. Complete typhus and plague immunization was not carried out because of insufficient quantities of biologicals.[4] Suppressive anti-malarial therapy with atabrine was instituted on A minus 21. Ample supplies of atabrine were available, and all quantities of the drug used by Army and Navy personnel were provided by the ships' supplies up to the time of debarkation. The therapy started

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2. Ernest J. King, Second Official Report to the Secretary of the Navy, p. 19.

3. The Leyte invasion day was known as A or Able day.

4. Action Report, Commander Task Group 79.1, Leyte, p. 111. The shortage on board ships arose because the original objective for ships of the attack force had been Yap Island, where cholera, typhus and plague were neither endemic nor epidemic.

with 1/2 tablet a day for the first week, 1 tablet daily for the second week, 2 tablets daily for the third week, and 1 tablet daily for the remainder of the campaign.

Despite crowded quarters, poor ventilation, excess heat and lack of exercise, the health of the embarked troops remained good, and no serious epidemics developed. Sporadic outbreaks of diarrhea occurred on board various vessels, but it was the opinion of a medical observer that on the whole "an excellent job was performed in transporting so many officers and men this great distance."[5]

A conference of all medical officers, Army and Navy, was held prior to departure from the mounting area. At Eniwetok beachmasters and beach party medical officers held a conference to discuss possible improvements in evacuation of casualties from the beaches.

The Leyte Beaches

On 17 October, A minus 3, operations preliminary to the landings began; they resulted in the successful seizure of the small islands guarding the entrances to Leyte Gulf. Minesweepers cleared the approach channels and landing beaches, and reconnaissance of the main Leyte beaches was effected. The heavy preliminary bombardment successfully eliminated much shore opposition.

On the morning of 20 October, landing craft converged on the beaches like myriad ants drawn irresistibly towards a pile of

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5. Frederick A. Smith, Commander,(MC)V(S), USNR, Report to ComGen 5th MarDiv of Medical Observations on Invasion of Leyte, p. 4-a.

sugar. Throughout the day, wave after wave of the small craft beached on Leyte's shores, carrying the troops of the 10th and 20th Army Corps. Enemy artillery and mortar fire from hidden positions were thrown onto the beaches, but there was little small arms fire. The beachheads were established with greater ease than in earlier island campaigns.

During the assault landing phase, casualties were comparatively light.[6] Naval medical participation in the Leyte campaign was most active in two aspects-in the activities of the beach medical parties and during the process of evacuating the Army forces. The Army units, of course, carried with them their own medical personnel and supplies. Naval medical units of the beach parties consisted of 1 medical officer and 8 corpsmen from each of the transports. They were put ashore in the sixth wave and established themselves on the east coast of Leyte. In addition to the naval personnel of the medical beach parties, 1 Army medical officer, 1 Army dental officer, and 2 Army medical coprsmen accompanied each medical beach party. These Army personnel were actually the medical collecting units of the landing force, and their grouping with the medical beach party was found to give very satisfactory results.

First-aid treatment was administered with comparative promptness. On the average, initial dressings were supplied within 2 to 20 minutes of the time of injury.[7] Medical supplies on the beaches were

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6. Action Report, ComTaskGrp 79.1, Leyte, p. 122. A total of 1943 casualties (66 stretcher, 73 ambulatory, and 4 dead) were received aboard the transports up to Jig plus 5 hours.

7. Preliminary Report of Battle Casualties from K-2 Operations, from Surgical Consultant to Chief Surgeon, Surgeon General's Files, n.p.

adequate, and temporary shortages were quickly relieved by the transports. Some complaints were received that medical supplies did not reach their destination, and it was recommended, following the operation, that hospital corpsmen accompany the supplies to the beaches to assure delivery to the activity requesting them.[8]

A medical inspection of the beach medical facilities on Yellow and Violet Beaches on Able plus 1 disclosed an Army medical battalion clearing station set up about 300 yards inland. Through this medical activity casualties were being cleared effectively to Beach Yellow 2. Civilian casualties also were given medical attention by the Army medical battalion, but only a few were sent on to the beaches for evacuation by naval facilities.

Leyte Evacuation

The work of the Navy Medical Department in evacuating casualties was perhaps its outstanding contribution to the Philippine campaign, although this also was performed in cooperation with Army medical facilities. Plans for evacuation during the initial phase provided for a flow from the front lines to the battalion aid stations, to the beach party medical stations, and then out to APA's and AKA's. On A-day, casualties were first to be evacuated to surgically and medically equipped LST's. By the time the transports and cargo ships were unloaded and ready to leave anchorage, Army division, station, and corps field hospitals were to have begun functioning.. Evacuation and medical care was to revert completely to the Army

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8. Action Report, ComTaskGrp 79.1, Leyte, p. 114.

following the withdrawal of the APA's and AKA's. Hospital ships were scheduled to arrive off Leyte on A plus 1, A plus 3 and A plus 5. Actually, the USS MERCY arrived on A plus 5 days and took out 410 casualties, while the USS COMFORT arrived on A plus 9 days and removed 561 casualties.

On the whole, the chain of evacuation operated in accordance with plans. Land evacuation was considerably hampered, however, by the terrain and by the exigencies fostered by the rainy season. Swampy terrain and roads rendered impassable by mud and water made ambulances useless for the first five days of the operation. Only the LVT's, DUKW's and Weasels were able to churn through with wounded. Weasels were able to get through where even LVT's became mired. Considerable ingenuity was employed by the collecting sections. Occasionally a wounded man was laced to a stretcher to which two bamboo poles were attached to act as sled runners. The whole was then yoked behind a water buffalo and dragged through the swamp to a point where a Weasel could operate. The Weasel then evacuated the casualty to an LVT and the LVT to the beach. The time involved in land evacuation was frequently long - fatally long in cases of wounds of the gastrointestinal tract.[9]

The use of the medically and surgically staffed LST's was less effective than planned. Had the outline been possible to follow, the LST's would have provided the best type medical care in the

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9. F. A. Smith, Report of Medical Observations on Invasion of Leyte, p. 6-a.

shortest period of time from the moment of injury. However, for the plan to have worked it would have been necessary for the LST's to beach, and on some beaches this was not possible. On Red Beach Fox, LST 459 tried to land but was unable to get closer than 150 yards, where it grounded in six feet of water. Other LST's were hit by artillery and mortar shells. In addition, certain types of casualties were to be sent to designated LST's, but in practice, this was found to be almost impossible.[10] Despite these operating difficulties, the use of increased numbers of specialized LST's was again recommended by higher echelons at the close of the campaign.[11]

Night evacuation was facilitated by the use of PCE(R)'s stationed about 3,000 yards off the beaches and marked with low lights.

At Leyte, as in earlier campaigns, the APA's, and AKA's performed valuable services in the evacuation process. Even before the landings, careful preparation was made aboard these vessels to receive casualties. On one Coast Guard transport, on the evening of 19 October, pharmacist's mates converted the chief petty officer's quarters into a temporary sick bay.. Wires were strung overhead, and from these wires strong lines were attached every few feet. Bottles of blood plasma could then be easily attached to this arrangement on

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10. Action Report, ComTransDiv 6, Leyte, p. 20. If, for example, four casualties--one orthopedic, one thoracic, one ophthalmic and one urological--were present at any one time, it would necessitate four LCVP's to take these casualties to the correct LST, or involve four time-consuming stops for one LCVP.

11. Endorsement of Com III Phib Corps to Action Report, ComLSTFlotilla 3, Leyte, p. 4.

the following morning when the casualties began to be brought aboard. Galleys were cleaned, scrubbed, and cots set up to handle overflow from the sick bay.[12]

Prior to departure from the mounting area, the medical department staffs of most of the APA's (3 medical officers and 20 corpsmen) were augmented by an additional medical officer and 10 additional corpsmen. Specialists were distributed among the various transports, and medical supplies stocked for the operation.[13] At Leyte, no complaints were made regarding penicillin shortages on transports. The Naval Medical Supply Depot at Pearl Harbor allowed each transport about 150 ampules, and some ships carried additional supplies of the valuable drug.

The transports received casualties up to the time they departed on Able plus 1. Their treatment of the wounded was highly commended by Army hospital facilities on Hollandia where they were disembarked. The Army surgical consultant declared: "They arrived in good physical condition, well fed, well bathed, in clean clothes, all expressing gratification with the care given by the Navy."[14] The average length of time between injury and arrival on a naval transport had been only one hour and 20 minutes. Wounds had been properly debrided,

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12. Press Release, 9 Nov. 1944, Hospital Corps Archives.

13. The USS APPALACHIAN, USS J. FRANKLIN BELL and USS RIXEY each carried an eye surgeon in this engagement.

14. "Preliminary Report of Battle Casualties from K-2 Operations, from Surgical Consultant to Chief Surgeon," n.p.

dusted with sulfonamide powder, and packed lightly with vaseline gauze. No wounds were closed by primary suture except those of the abdomen, chest, and scalp. Almost all wounds were clean and healing well. All wounded had received sulfonamides by mouth, and those with moderately severe or severe wounds had received penicillin.

An examination of the individual reports of the transports present at Leyte indicate less overcrowding and more equitable distribution of casualties than in earlier Pacific campaigns. The USS LAMAR reported that the medical beach parties had done an excellent job of distributing wounded among transport medical facilities.[15] This finding was reiterated by the USS FREDERICK FUNSTON, USS HARRIS, USS DOYEN, and the USS ALMAACK.

Preparations for evacuation of casualties at Leyte were based on the following casualty estimates for the east coast operation:[16]

UNIT	NO. TROOPS	LITTER	AMB.	NO.
White Beach, 1st Cal. Div.	20,150	7.6%	10%	1,680
Red Beach, 24th Inf. Div.	17,250	8%	10%	1,428
Orange and Blue, 96th Inf. Div. Beach	25,600	7%	10%	2,184
Violet and Yellow Beach, 7th Inf. Div.	25,900	8%	10%	2,154

Actual figures obtained at White Beach and Red Beach on A plus 2 indicated only a 2 percent litter casualty rate and a 5 percent ambulatory rate. Both from a medical and military standpoint, the Leyte evacuation was successful.

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15. Action Report, USS LAMAY, Leyte, p. 6.

16. F. A. Smith, Medical Observations on the Invasion of Leyte, p. 5-a.

Civilian Medical Care

A third aspect of the Leyte invasion, in which the Navy Medical Department participated, was the field of civilian affairs. Prior to the landings, orders had been issued to Navy and Army medical personnel participating in the invasion to give medical care to natives wherever possible. The Filipinos in the battle area came to the aid stations in great numbers.[17] In addition to injuries resulting from battle, many chronic ailments received treatment--tropical ulcers, chronic coughs, gastrointestinal disturbances, coleric of infancy and many other complaints. A number of cases of pregnancy also came into the beach aid stations. One was sent out to an APA for delivery, and the ship's chaplain christened the baby after the name of the ship. A number of wounded natives were evacuated on the transports when the ships left their Leyte anchorage.

Recommendation was made, after the campaign, that the civilian affairs authorities (in this case Army personnel) establish aid stations for civilians early in the course of a campaign.[18] It was felt that such a procedure would eliminate a certain natural confusion that accompanied the descent of hundreds of wounded and sick natives upon a medical facility engaged in the treatment of injured military personnel. However, the methods employed by Navy and Army medical personnel in caring for the natives during the course of the Leyte battle were a considerable improvement on previous Pacific campaigns.

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17. Ibid., p. 7-a.

18. Ibid., p. 12-a.

The Leyte Battle Afloat

During the period of the Army landings and as General MacArthur's forces pushed inland, the Japanese flung down a powerful naval challenge to the American invasion, in the Battle of Leyte Gulf. From 23-26 October the enemy's navy involved the American Third and Seventh Fleets in a series of major surface and air engagements which culminated in the Battle of Surigao Strait, the Battle off Samar, and the Battle off Cape Engano. By the evening of 26 October, the American war vessels had secured a total victory, and three great Japanese naval forces were either destroyed or had retreated beyond the immediate range of the American fleets.[19]

During this series of great sea battles, Navy Medical Department personnel aboard the ships of the line were repeatedly called upon to care for casualties resulting from the naval and air attacks of the Japanese fleet. Severe losses were suffered by the American Third and Seventh Fleets, since the Battle for Leyte Gulf marked the initiation of a devastating new Japanese weapon--the "kamikazi", or suicide plane. Painted in dark colors with large red balls on the wings, the "kamikazes" centered their attention on the big ships--the carriers and the battleships. But even LST's occasionally served as targets. As the months of the Philippine struggle continued, the suicide planes increased in number and vied with the old style torpedo bombers in the sinking and damaging of the American vessels.

One of the most disastrous hits occurred when the carrier

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19. Second King Report, pp. 20-22.

USS PRINCETON was bombed and the explosion on the USS BIRMINGHAM which had come alongside to aid in salvage work followed. On the morning of 24 October, the PRINCETON was struck by a heavy aerial bomb carried by one of the suicide planes, and flames from the explosion caused terrible damage. Both the forward battle dressing station and the battle dressing station amidships were rendered useless by the explosion and flames. About a half-hour after the hit, the order "All hands topside" was given. At the same time the main battle dressing station in the sick bay and the after battle dressing station were evacuated.[20]

At about 1030 the USS GATLING (DD671) came alongside the forecastle and all casualties were evacuated to the destroyer. Lines, ladders and nets were used to evacuate the crew from the flaming ship; as well as motor whale boats for the seriously wounded.[21] Among the PRINCETON casualties 7 deaths occurred, 92 were listed as missing, and 191 were wounded.

The toll of deaths resulting from the PRINCETON's bombing was to be still higher before the episode was concluded. At 1530 the same day, the USS BIRMINGHAM came alongside the PRINCETON to aid in the salvage work. Two minutes later a terrific explosion from the after portion of the PRINCETON blew off the ship's stern, throwing shrapnel and debris of all types onto the BIRMINGHAM. Over half of the BIRMINGHAM's

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20. Action Report, USS PRINCETON (CVL23), Philippines, Loss of Ship, pp. 90-91.

21. Action Report, USS GATLING, Philippines, p. 25. The PRINCETON, hopelessly damaged, was sunk under order by the USS IRVIN and the USS RENO, 26 Oct. 1944.

personnel were wounded or killed by the PRINCETON's explosion.

A quick survey by the BIRMINGHAMS's executive officer revealed the following situation:

> On the main deck, from 140 to 150 bodies, dead, dying and wounded, many of them horribly, covered the decks. The communication platform was no better. Blood ran freely down the waterways, and continued to run for some time. Words will never describe the maginficent manner in which the dying and wounded acted. Said the executive officer... "I really have no words at my command that can adequately describe the veritable splendor of the conduct of all hands, wounded and unwounded. Not only was there not the slightest tendency towards panic, there was not a single case that came to my attention directly or reportedly where anything but praise could be given...Men with legs off, with arms off, with gaping wounds in their sides, with tops of their heads furrowed by fragments, would insist, 'I'm all right. Take care of Joe over there', or 'Don't waste morphine on me Commander, just hit me over the head.' " 23

The BIRMINGHAM's chaplain commented on the terrible severity of the wounds--"case after case of compound fracture, legs and arms missing, abdominal contents protruding through the belly wall, blood gushing from huge wounds, skulls laid open, and, intermingled with the living, many dead." 24 In all, 229 were killed, 4 missing, 211 wounded seriously, and 215 suffered mild to severe wounds. Six of the seriously wounded died later.

At the time of the explosion, the BIRMINGHAM's senior medical officer was on the USS SANTA FE assisting in an operation. Since the dentist was among the first killed, the sole doctor remaining on the

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22. War Diary, USS BIRMINGHAM, for the month Oct. 1944, p. 21.

23. Ibid., p. 22.

24. Ibid., p. 25.

cruiser was the junior medical officer. Fourteen hospital corpsmen, however, were available, and with the JMO and officers and men of the ship's company, they cared for the wounded until noon, 27 October, when 211 cases were transferred to the USS SAMARITAN.

In the first hours only a few minutes could be given to each of the wounded--hemorrhages were stopped, morphine was administered, and wounds were sprinkled with sulfa powder and covered by battle dressings. The ship's company had received frequent instruction in first-aid methods and the knowledge proved of inestimable value. The doctor and hospital corpsmen devoted most of their time to the treatment of shock and severe hemorrhage, and to the application of difficult bandages.[25] In all, 198 units of plasma, 20 flasks (2,000 cc.) of 5 percent dextrose in normal saline, and 500 cc. of whole blood were used. Open wound cases were given booster doses of tetanus toxoid.

The second phase of the medical care was initiated as soon as medical department personnel could be spared from the treatment of shock, pain and hemorrhage. Perforated abdominal wound cases were separated from the rest for operation. At this time also, two groups were formed to splint fractures. Open wounds of compound fractures were sprinkled with sulfanilamide powder. On 26 October (two days after the explosion) a doctor and three corpsmen from the USS RENO were put aboard the BIRMINGHAM to give medical assistance to the ship's medical personnel.

In the third phase of emergency medical treatment, the patients

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25. Action Report, USS BIRMINGHAM, Fleet Operations 18-24 October 1944, p. 16.

were segregated, the most severly wounded being moved to the sick bay and the wardroom. All other cases were carried down to the second and third decks, and the more serious cases placed near the dressing and treatment stations. During this period the two medical officers examined every patient carefully and the wounded were tagged with their name, rate, division, serial number and diagnosis. All bandages were renewed, splints checked and tractions adjusted.

In the fourth step, with the aid of medical officers from the SAMARITAN, serious cases were selected for removal to the hospital ship.

The treatment rendered aboard the BIRMINGHAM was of necessity primarily first aid, except in cases of perforated abdominal wounds. In the effort to save as many lives as possible, no other definitive treatment could be undertaken with the limited number of medical department personnel in ratio to the heavy casualty numbers. Only five abdominal cases were operated on. Of these, two died. Among the 420 wounded aboard the BIRMINGHAM, only eight cases (2 percent) were fatal. The medical officer of the BIRMINGHAM felt this record to be a strong argument in favor of the deferment of definitive treatment in order to save as many lives as possible.[26]

Some recommendations for improving procedure were made. It was suggested that all fighting ships be allowed 15 units of plasma per 100 men instead of 5 units, which had been the allowance. It was further recommended that Supply Corps personnel be specially trained to dispense

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26. Action Report, USS BIRMINGHAM, p. 18.

and distribute medical supplies according to plan and thus release medical department personnel for more professional tasks.[27] Better care of the wounded resulted, it was found, if those administering aid could obtain at least three or four hours' sleep out of the twenty-four. Throughout the first night many of the medical staff went without any sleep at all, with resulting impairment of officiency. No alternative was possible, however, with the great number of wounded. Larger supplies of penicillin were also indicated. Only 200,000 units were carried aboard the BIRMINGHAM because of the shortage, and it was not possible to administer it to "cases in imminent danger of infection."[28]

During the closing days of October and the month of November, as the invading Army forces battled their way further into the Leyte jungle, Japanese planes kept up their attacks upon naval vessels off the beaches and in Leyte Gulf. Four suicide bombing attempts were made on the USS TICONDEROGA in Ormoc Bay during the 7 December landings. None succeeded here, but a month later off Formosa a "kamikaze" severely damaged the carrier.[29]

In the Leyte landings at Ormoc the USS MARYLAND suffered a hit which killed 31 and injured 30. A "kamikaze" plane carrying a 500-pound bomb crashed into the port side of turret one, and the bomb exploded on the armored second deck, maiming and burning all in its vicinity.

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27. Ibid.

28. Ibid.

29. Action Report, USS TICONDEROGA, Ormoc Bay, p. 25.

By December, the danger to the large ships from the suicide planes was well recognized and the medical department personnel and facilities had been reorganized with this constant threat in view. More adequate medical supplies were widely distributed about the MARYLAND in anticipation of possible destruction of the sick bay area. Such destruction was exactly what happened as a result of the 7 December hit, and the injured were carried, according to plan, to a newly established sick bay in the junior officers' and warrant officers' wardrooms on the second deck aft of midships. After adequate emergency treatment had been administered, the more seriously injured were transferred to the LST 171 and thence to a hospital ship fifteen hours after the crash.[30]

The pattern of early evacuation of "kamikaze" casualties via an LST to a hospital ship was repeatedly followed in the Leyte battle afloat. The USS MAHAN (DD364) was severely damaged in the Ormoc Bay landings and had to be sunk by American gunfire. Its casualties were taken via LST 464 to the USS MERCY 22 hours after the action.[31] The USS HUGHES (DD410), hit on 10 December, transferred its casualties first to the USS LAFFEY (DD724) and then on the next day via LST to a hospital ship.[32]

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30. Action Report, USS MARYLAND, Suicide Plane Attack, Leyte Gulf, p. 13.

31. Action Report, USS MAHAN (DD364), Ormoc Bay, pp. 22-23.

32. Action Report, USS HUGHENS (DD410), p. 10.

The part played by the Navy Medical Department in the Leyte invasions, as in all the Philippine campaigns, was a limited one confined mainly to the early phases of the operations--on the beaches and in the process of evacuation. Hospitalization and the administering of definitive treatment to the wounded personnel of the Army divisions was carried out by Army medical facilities. The cooperation between Army and Navy medical personnel in the embarkation process and during the beach phase and evacuation was notable.

The new emphasis upon care of the wounded aboard ships of the line was a direct result of the "kamikaze" phase of warfare. It was during the Philippines operations that this new form of warfare, which was to constitute the most serious menace to the Pacific fleets in the later stages of the war, was initiated. All medical personnel were required to put forth their utmost efforts to bring medical order out of the flaming chaos created by the "kamikaze" hits. Their work is deserving of the highest praise.

Section 2 - The Luzon Invasion

With the occupation of Leyte well underway, attention was centered on the largest of the Philippine Islands, Luzon. On 15 December, Army forces had been put ashore in Mindoro Island, 300 miles northwest of Leyte, without shore opposition. Twenty-four hours later, American planes and PT boats were operating off the southern coast of Luzon from this island. Three weeks later came the Luzon invasion, a campaign on a considerably larger scale.

Lingayen Gulf

The attack at Lingayen Gulf had as its object the "prompt seizure of the Central Luzon area, the destruction of the principal garrisons, the command of organizations and hostile defense forces in the Philippines, the denial to the enemy of the northern entrance to the South China Sea, and the provision of bases for the support of further operations against the Japanese."[33]

Command status was similar to that carried out at the Leyte operation--the Commander Seventh Fleet in over-all charge of the expedition under the Commander-in-Chief, Southwest Pacific area. Immediately upon the landing of the troops, command reverted to the Commanding General Sixth Army.[34]

Lingayen Gulf stretched 20 miles wide and 30 miles deep, and, with its shallow sand beaches at the foot of the gulf offered good landing sites for amphibious operations. Behind the beaches rolled a flat plain interspersed by marshes. Bordering the plain to the east

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33. Action Report, ComTaskForce 78, Lingayen, p. 3.

34. Action Report, Com III Phib Forces, Luzon-Lingayen Gulf, pp. 5-6. The naval organization for the invasion was as follows: Vice Admiral Kinkaid, Commander Seventh Fleet, in command of amphibious operations as Commander Task Force 77, the Luzon Attack Force; Vice Admiral Wilkinson, Commander Third Amphibious Force in command of Task Force 79, designated as the Lingayen Attack Force, and Vice Admiral Barbey, Commander Seventh Amphibious Force, in command of Task Force 78, designated as the San Fabian Attack Force. Task Force 79 had as its mission the transportation, protection and landing of the XIV Army Corps at Lingayen Gulf in the vicinity of Lingayen. Task Force 78 was to perform similar service for the 1st Army Corps, in the vicinity of San Fabian. The day of the initial assaults was designated as S-day, and the hour of the initial landing of TF 78 as How hour, that of TF 79 as Jig hour.

and west were ranges of hills and mountains. A highly favorable feature for the invading forces was the January season which offered the driest condition of low ground during the entire year.[35]

Those concerned with medical planning had several factors to consider - the number of Army and Navy personnel involved, length of the lines of communication, the relation of the various designated landing beaches to each other and their hydrographic conditions, the enemy's capabilities which had led to the assumption that casualties would be heavy, especially on S-day, and the number of ships available.for care of casualties.[36]

Especial attention was paid to the problem of medical supply. Medical Storehouse Number 6 at Manus and the Army Medical Supply Depot at Hollandia were the sources of medical supplies to be used by ships of the task force. Adequate provisions were obtained prior to the departure for the objective. At Hollandia, however, considerable inconvenience was encountered at the Army Medical Supply Depot, and it was felt that much of this difficulty could have been spared had there been a Navy source of medical supply afloat or at the naval base at Hollandia.[37]

Additional medical personnel were ordered to each APA participating in the invasion, bringing the average medical department complement of each transport to 4 medical officers and 27 hospital corpsmen.

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35. Action Report, Com Luzon Attack Force, Lingayen, p. 4.

36. Action Report, ComTaskForce 78, Lingayen-San Fabian, p. 33.

37. Action Report, Com III Phib Forces, Luzon-Lingayen, p. 68.

As at Leyte, Army medical personnel were to carry the real burden of caring for troops of the invasion forces throughout the campaign.

Prior to embarking, all troops had been given the prescribed immunization aboard ship. In addition, under the supervision of the commanding officer of the troops, atabrine was administered in regular doses. Despite this, sporadic cases of clinical malaria developed en route to Lingayen, and were treated by the ships' medical officers. No epidemics broke out on the voyage. One case of scarlet fever which developed aboard an APA caused a slight flurry, but sulfadiazine was immediately administered to all personnel aboard the vessel and no further outbreak occurred.[38]

Lingayen Landings

S-day was set for the morning of 9 January, and during the first week of the month the American force gathered east of Leyte. Over the sunken wrecks of the Japanese warships in Surigao Strait the ships steamed, and on into Mindanao and Sulu Seas. As the assault force came closer to the west coast of Luzon, noisy guerrilla demonstrations were raised in soutern Luzon under General MacArthur's direction to divert Japanese attention. Navy minesweepers swept the south coast bays of Balayan, Batangas and Taybas, and Army transport planes dropped dummies to simulate a parachute invasion in the south.[39]

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38. Action Report, Com Reenforcement Group, Luzon, p. 51.

39. Biennial Report of the Chief of Staff of the U. S. Army to the Secretary of War, p. 75.

The results of this carefully contrived plan of diversion were excellent. On Luzon Japanese forces, harassed by guerrillas and plane fire, drove in all directions throughout the island and became tangled in a hopeless web of confusion. Bridges and roads were blown up by guerrilla bands, causing endless traffic jams. When the attack came at Lingayen Gulf, the Japanese had dissipated their real chances of repulsing the American forces.

Bombardment of the Lingayen beaches began on S minus 2 and continued until immediately before the landings were effected. Just prior to H-hour, over 7,500-4.5 inch rockets tore into the Japanese defense installations. Once again the pattern of myriad little amphibious craft was spawned from the transports off a Philippine beach, as the Sixth Army moved ashore along Lingayen Gulf. By nightfall the American forces were in control of a 15 mile beachhead 6,000 yards deep, and 68,000 troops had been landed.[40]

The effectiveness of the preliminary bombardment was visible in the slight opposition met by the landing forces. Mortar fire and a light artillery fire were raised by the enemy at night, but only slight damage and few casualties resulted.

Beach Treatment

Naval medical participation in the Luzon-Lingayen landings, as at Leyte, was limited largely to treating and evacuating casualties

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40. Ibid.

on the beaches in the early phase of the invasion. The greatest medical problem confronting the Navy at Lingayen was to arise not in the shore battle, but in the battle afloat, where casualties were to be the heaviest yet experienced afloat in previous Pacific campaigns.[41]

On the Lingayen beaches, Navy medical personnel from the APA's formed the medical beach parties. Army medical personnel collected the wounded and brought them to the beach aid stations. Here, Navy medical officers administered any further necessary first aid and screened the casualties. Those requiring immediate surgery were sent to the surgical teams aboard surgical LST's beached on the shore. Patients with minor wounds, and ambulatory cases were sent directly to the APA's for treatment.[42]

At the beach aid stations, especial attention was paid to the degree of shock and loss of blood suffered by the wounded. Whole blood was administered as a part of the first-aid routine wherever it was indicated. Blood supplies were ample, provision for this vital medical weapon having been made both by Sixth Army medical personnel and the Navy medical officers from the transports.

One aspect of medical beach treatment which functioned well was the use of the surgical LST. Several of these were ordered to both the Lingayen and San Fabian beachheads, where they were beached to provide early definitive treatment for those cases in which time was a

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41. Action Report, Com III Phib Forces, Luzon-Lingayen, p. 68.

42. Action Report, ComTaskForce 78, Lingayen-San Fabian, p. 34.

vital medical factor in recovery. Each LST had approximately 50 bunks available for litter patients in addition to emergency operating facilities. The surgical LST's operated not only as a part of the evacuation plan, but also as an integral unit of the Luzon beach treatment.

The relatively smooth functioning of the Lingayen beach treatment was due in part to the light casualties. So few were the casualties on White Beaches One and Two that it was possible for the hospital corpsmen of the USS CAVALIER beach party to assist in unloading cargo.[43]

Evacuation

Careful attention had been given to the problem of evacuation at Lingayen Gulf. In the background was the expectation of a heavy casualty load - proportionately worse than in previous Pacific campaigns. The careful military strategy which preceded the invasions, however, was responsible in large degree for the small number of wounded in the initial invasion.

Under the evacuation plan, surgical LST's were to unload supplies and then to remain at the beaches indefinitely, or until Army medical and evacuation facilities had been set up ashore. They were equipped with two additional surgeons and five additional hospital corpsmen so that they could give treatment day and night. When they were ready to reduce their casualty load, they retracted and unloaded onto an APA or APH. At Lingayen, five LST's were anchored at the beaches and one was kept near the force commander's AGC, so that it could be

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43. Action Report, USS CAVALIER (APA37), Lingayen Gulf, p. 7.

sent to the shore to relieve a withdrawing LST, or be sent alongside some ship that had been badly hit.[44] In addition, three PCE(R)'s were supplied with a supplementary medical officer, and were anchored near the force commander's ship to be used for emergencies.

Many of the APA's were scheduled to depart on the night of S-day, and these were loaded with easily evacuable casualties that afternoon. APH's were ordered to remain in the assault area after unloading, to receive casualties for evacuation. No hospital ships arrived at the Lingayen beaches, but they received casualties from the transports on the return to the Leyte anchorage.[45]

At the staging area the surgical LST's were supplied with 48 pints of blood by the Army. They also received 20,000,000 units of penicillin and additional gas gangrene anti-toxin. Four hundred pints of blood for the transports were supplied by the Navy blood bank aboard an LST at Leyte. Resupply echelons arriving on S plus 2 and S plus 4 brought further whole blood supplies which had been flown from the United States. Light casualties and extensive blood supplies resulted in more than adequate amounts for medical facilities both afloat and ashore.

Control of the evacuation of casualties was in charge of a casualty evacuation control officer on each of the beaches. This

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44. Unsigned Report on Lingayen Medical Activities, Personal Files of the Surgeon General, n.p.

45. Action Report, Com Luzon Attack Force, Lingayen, p. 79.

officer kept all available data on the location of specialists aboard the transports and the capacities of the transports acting as evacuation ships from his particular beach. The plan provided the best evacuation control seen in any of the Pacific campaigns. However, a real test of its efficiency was not possible because of the light casualty rate.[46]

The shore casualties were surprisingly light. Between S-day and S plus 4, approximately 720 wounded were evacuated in transport echelons.[47] Between S minus 3 and S Plus 30, total casualties were 1,909 an average of 39 per day. An approximation of the number of casualties cared for by evacuating transports in the first days of the invasion can be obtained from the following figures of personnel casualties handled by Task Group 79.2 at Lingayen:

Ship	Navy	Army	Total
9 January 1945			
ROCKY MOUNT	6	1	7
MONROVIA	16	11	27
KNOX	3	0	3
CUSTER	4	0	4
CHARA	4	0	4
ASHLAND	2	0	2
LINDENWALD	7	0	7
CLAY	4	0	4
ARTHUR MIDDLETON	12	1	13
WILLIAM P. BIDDLE	2	0	2
GEORGE F. ELLIOT	0	3	3
CALVERT	5	0	5

46. Action Report, ComTransDiv 2, Reinforcement Lingayen, p. 14.

47. Action Report, Com III Phib Forces, Luzon-Lingayen, p. 68.

Ship	Navy	Army	Total
10 January 1945			
WAR HAWK	47	23	70
ALCYONE	6	0	6
MONROVIA	46	16	62
FREDERICK FUNSTON	12	0	12
TOTAL	219	72	291

[48]

No new casualties were handled up to S plus 3. Many of the Navy casualties were transfers from ships hit by "kamikaze" attacks.

The majority of serious casualties at Lingayen came from the badly damaged ships. High percentages of burns from the "kamikaze" explosions were responsible for a number of deaths. Flash burn cream had not as yet begun to be used on a widespread basis, and there were many burns of the face, neck, throat, and exposed parts of the arms and ankles.[49]

The Lingayen Battle Afloat

Destruction wrought by Japanese "kamikaze" planes at Lingayen Gulf was heavy. Ship after ship of the task force shuddered under the impact of a Japanese plane carrying a 500 pound bomb crashing into the decks or the superstructures.[50] By the time of the Lingayen operation

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48. Action Report, ComTaskGroup 79.2, Lingayen Gulf, p. 41. The total are given exactly as found in the source. When the figures given are added they show: Navy, 176; Army, 55; and joint totals, 231.

49. Action Report, ComTaskGroup 79.4, Lingayen, p. 35.

50. Action Report, Com Luzon Attack Force, Lingayen, pp. 64-73. The following gives a list of ships with their casualties resulting from "kamikaze" hits in the Philippine area during the month of January. In addition to those cited twenty other ships were hit,

the suicide planes had become a major part of the Japanese plan of defence. American forces were now operating in areas adjacent to many Japanese airfields. In addition, the "kamikazes" were maneuvering more successfully than before. Full utilization was made by the Japanese of the heavy cloud coverage which persists in the Philippine area, and the planes would hop from cloud to cloud until a good opportunity for striking presented itself. Despite the increase in "kamikaze" hits, the American vessels put up strong antiaircraft defenses, and instituted

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on which casualty figures are not included in the list.

USS COWANESQUE (AO79)	2 killed	2 wounded
SS DYCKE	sunk with all hands	
USS OMMANEY BAY (CVE79)	6 killed	65 wounded
	87 missing - sunk	
USS HELM (DD388)		6 wounded
USS LOUISVILLE (CA28)	1 killed	75 wounded
USS ORCA (AVP49)		4 wounded
HMAS AUSTRALIA	25 killed	30 wounded
USS MANILA BAY (CVE61)	10 killed	75 wounded
USS WALKE (DD723)	15 killed	32 wounded
USS R. P. LEARY (DD664)		1 wounded
USS NEWCOMB (DD586)	2 killed	11 wounded
USS NEW MEXICO (BB40)	30 killed	87 wounded
USS BROOKS (APD10)	3 killed	10 wounded
	ship put out of action	
USS MINNEAPOLIS (CA36)		2 wounded
USS CALIFORNIA (BB44)	41 killed	155 wounded
	3 missing	
HMAS AUSTRALIZ (second hit)	14 killed	26 wounded
USS SOUTHARD (DMS10)		6 wounded
USS COLUMBIA (CL56)	20 killed	35 wounded
USS LOUISVILLE (CA28)	28 killed	6 wounded
	10 missing	
USS LONG (DMS12)	sunk	7 wounded
USS LST 918	4 killed	4 wounded
USS LST 912	4 killed	3 wounded
USS CALLAWAY (APA35)	30 killed	20 wounded
USS KITKUN BAY (CVE71)	16 killed	15 wounded
USS COLUMBIA (CL56)	17 killed	7 missing
USS MISSISSIPPI (BB41)		8 wounded
USS LERAY WILSON (DE414)	7 killed	3 wounded
	3 missing	

improved damage control programs.

Navy medical facilities were frequently severely hampered in the attacks. Time and again bombs would crash into sick bay areas destroying personnel and supplied. The account of a hit on the USS MANILA BAY (CVE6) in Lingayen Gulf on S minus 4 days illustrates how medical department personnel met such a situation. The suicide plane with its bomb crashed into the flight deck of the carrier, directly above the sick bay. All medical personnel in the sick bay area, although injured, continued functioning. Light and ventilation of the area were completely shut off, and shortly after, the rooms were flooded with oil, water, gasoline and foamite from above. Rallying its forces, the medical department staff directed the setting up of a substitute sick bay in the forward battle dressing station on the upper deck, and the wounded were carried to this station. In addition to the damage to the sick bay, the hangar deck battle dressing station had been completely demolished.

Throughout the night the wounded were treated in the forward battle dressing station, while repair crews worked continuously to repair the sick bay area. Forty-eight hours after the hit the MANILA BAY was again operating its sick bay. In all, 14 were killed, 51 wounded

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USS DUPAGE (APA41)		35 killed	157 wounded
USS GILLIGAN (DE508)		2 killed	6 wounded
USS BELKNAP (APD34)		19 killed	37 wounded
USS DICKERSON (APD37)			13 wounded
USS LST 778		7 killed	12 wounded
USS ZEILEN (APA3)		5 killed 3 missing	32 wounded
USS SALAMAUA (CVE96)	5 missing	10 killed	87 wounded

51. Action Report, Com Luzon Attack Force, Lingayen, p. 84.

and 1 missing.

As a result of the large percentage of burn injuries from the explosion, the carrier's medical officer requested that improvements in flash proof clothing be initiated. The three piece head protector was felt to be the most vulnerable to loss, and in addition it was difficult to wear. A further recommendation for improved stowage facilities for protective clothing at battle stations was made.[52]

Another victim of a Japanese suicide attack during the Lingayen Gulf operation was the USS NEW MEXICO (BB40). In this case, the "kamikaze" landed in the superstructure of the battleship killing 30 and wounding 87 seriously and 42 lightly. Many of the casualties were caught among the wreckage in almost inaccessible areas. Post-operation reports recommended increased numbers of assigned stretcher bearers as well as a greater coordination of medical and volunteer aid in meeting such emergencies in the future.

It was not possible to evacuate the wounded from the NEW MEXICO until 13 days after the hit. For four days immediately following the explosion the battleship was almost continuously at general quarters under repeated air attacks. This situation had unfavorable results on the wounded, and placed medical department personnel under a serious strain. Battle dressing stations had to be manned during the day to care for subsequent casualties. Definitive treatment could not, for the most part, be administered until the night. Critically wounded were

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52. Action Report, USS MANILA BAY (CVE61), Lingayen, p. 79.

hospitalized in an air conditioned ward, but many seriously wounded and neuropsychotic cases had to be quartered in cramped, non-ventilated areas with detrimental effects. The continual salvos of gunfire produced a state of anxiety among the wounded which was not conducive to good recovery. In addition, the retention of the wounded aboard the battleship had an adverse effect upon the morale of the crew. Those not yet wounded were made constantly aware of the plight of their comrades. Recognizing the overtaxed conditions under which the medical department was already working, they feared that if their turn came they might not receive adequate care. "Too much emphasis cannot be brought to bear upon the importance of early evacuation of the wounded from a combatant ship", reported the NEW MEXICO's senior medical officer. "This factor is considered as essential as rearming and refueling. The later, incidentally, was accomplished while the casualties were still aboard."[53]

The need for improvement in first-aid instruction aboard the NEW MEXICO was indicated after the January hit. Despite the fact that first-aid lectures and demonstrations had been given to officers and men a few weeks before the engagement, insufficient first aid was rendered by non-medical personnel in the emergency.[54] While ample medical supplies were available, in many cases only morphine was given and battle dressings were not applied to wounds. Delay in first-aid treatment, until medical personnel could reach the scene, in some instances contributed to increased severity of shock.

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53. Action Report, USS NEW MEXICO, Lingayen Gulf, Kamikaze Attack, pp. 105-106.

54. Ibid., p. 108.

Requests were made by medical officers aboard the NEW MEXICO for further equipment with which to meet the increased medical hazards caused by the "kamakaze" attacks. A refrigerated processing tank for X-ray work, sternal puncture needles for administering plasma, a modern fracture table, more adequate ventilation in the sick bay, and a better supply of water in suitable containers for gun crews were all felt to be necessary for proper medical care aboard a battleship.

The problem of a sudden incidence of great numbers of severely wounded men rose again and again on the capital ships at Lingayen Gulf. To meet this situation adequately Navy Medical Department personnel worked day and night. On 6 January the USS CALIFORNIA experienced a hit by an enemy crash diving plane and a simulataneous explosion of one of its own five inch shells. Two hundred three casualties resulted.[55] Doctors and corpsmen worked for the two succeeding days and nights without rest to bring medical aid to the wounded. It finally became possible to transfer 67 cases to the USS BOLIVAR (APA34), and 13 other patients to the PCE 582 for further transfer to a naval hospital. At noon of 7 January 1945, 130 survivors were brought to the CALIFORNIA from the USS LONG, USS BROOKS and USS HOVEY. Fifty-two of these survivors needed medical care, and were added to the CALIFORNIA's own long casualty list of the preceding day.

The most notable factor resulting from the attacks of the suicide planes was the severity of wounds and multiple compounded

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55. Action Report, USS CALIFORNIA, Bombardment of Luzon Island, Lingayen Gulf Area, p. 9.

injuries. The USS LEXINGTON, struck by a "kamikaze" early in the Philippine campaign, suffered 182 casualties, 50 dead and 132 injured. Almost all of these patients suffered from burns of varying degrees of intensity, along with combinations of blast concussion, fractures and shrapnel wounds.[56] The USS COLORADO with 69 casualties on 6 January had to deal with similar conditions, as did also the USS MISSISSIPPI on 9 January. The COLORADO, recognizing the increasing danger of the "kamikaze" planes, requested a large increase in Hospital Corps personnel for ships of the line engaged in "the present, unusually hazardous duty."[57]

Treatment of battle wounds had become fairly standardized by the time of the Lingayen campaign. Following the application of first-aid measures, wounds were debrided, and sulfanilamide powder and sterile dressings applied. Tetanus booster shots were given in most cases. Liberal reliance on transfusions was made- not only of plasma, but more and more frequently of "O" type blood. Severe burn cases were debrided under pentothal anesthesia, and sterile petrolatum and sulfanilamide dressings were applied under pressure bandages. In some instances, by the time of the third day after treatment, burn dressings had become so foul smelling due to escaping serum, rising temperatures and poor ventilation, that further treatment became necessary for the morale of most of the patients. In such instances, the dressings were removed, broken blisters debrided, all burned areas sprayed with Pendleton's

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56. Action Report, USS LEXINGTON, Attacks on Luzon, p. 33.

57. Action Report, USS COLORADO (BB45), Lingayen Gulf, p. 148.

mixture of parrafin, cod liver oil, sulfadiazine, camphor, and menthol oil or eucalyptol. In most cases morphine was used "generously" and sulfathiazole given orally.[58]

As a direct result of the increased "kamikaze" program, nervous tension on ships of the line ran high throughout the Philippine invasion. Increasingly it was noted by medical officers that numbers of men reported to sick call for "vague mental complaints."[59] Irritability, depression, anxiety, and fatigue marked the strain under which the men and officers were required to perform their duties in the battle afloat. The senior medical officer of the aircraft carrier USS CABOT stated that time for the execution of various jobs had increased by as much as 50 percent. Continuous action, especially under the threat of suicide bombers, lack of recreation and rest, and lack of replacement of personnel were the major causes for nervous fatigue.[60] On the minesweeper USS SOUTHARD (DMS10) signs of nervous strain were especially marked. "The action in Lingayen Gulf," wrote the commanding officer, "was the severest that the present ship's crew had ever experienced. The numerous calls to general quarters en route, the sight of numerous suicide attacks on ships in company, the necessity of staying at general quarters during daylight hours for three days prior to S-day, and a suicide dive on 'own ship', all contributed to a severe nervous strain. As a result a few members of the crew 'cracked up'."[61] Those who were

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58. Action Report, USS MISSISSIPPI, Lingayen Gulf, pp. 36-37.

59. Action Report, USS CABOT, Luzon Strike, p. 14.

60. Ibid.

61. Action Report, USS SOUTHARD (DMS10), Lingayen Gulf, p. 15.

unable to continue under the nervous pressure were not "green" and untried personnel, but men who had been on the ship for a long time.

Everything possible was done by medical department personnel aboard the ships to assure the crew of the best possible medical care following a suicide attack. Medical supplies were packed in large metal cases and dispersed widely throughout the ships. On the USS TICONDEROGA (CV14) individual first-aid kits containing battle dressings, tourniquets, iodine, bandages, and morphine syrettes were issued to every officer and chief petty officer, and training in their use given. Medical officers, dental officers, and corpsmen were organized into fracture teams, burn teams, surgery teams, plaster cast teams, and plasma teams. Specialized personnel were trained as sorting teams to designate the casualties for proper treatment.

Over-all recommendations were made to improve conditions aboard the ships of the line to meet the "kamikaze" menace. Extra folding cots for the medical department were indicated, as well as increased plasma allowances.[62] Especial emphasis was placed on the wearing of protective clothing by all personnel. Even a recommendation against shaving the head or clipping the hair short was made, since hair of normal length provided more protection against burns and injury.[63] The commander of Battleship Division Four proposed the discontinuance of the use of glass wool insulating material on bulkheads and over heads,

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62. Action Report, USS COLUMBIA, Lingayen Gulf, p. 74.

63. Action Report, USS STANLEY (DD478), p. 17.

for this, under explosion, caused harmful personnel damage.[64]

The operations at Lingayen Gulf high lighted the medical problems posed by the new Japanese weapon, the "kamikaze" plane. As at Leyte emphasis for the Navy Medical Department was shifted from land to sea. Marine personnel were not involved in the Philippine landings, and even the problem of evacuation from the invasion beaches was taken over by the Army after the early days of fighting. This energy of Navy medical staffs had to be turned to combatting the "baka" planes and to bringing about medical order from the crippling blows levied against personnel and materiel in the battle afloat at Lingayen Gulf.

Section 3 - Concluding Operations

As the Army forces pushed down towards Manila from Lingayen and San Fabian, other tenacles of the American offensive tightened about the remaining Japanese strongholds in the Philippines. On 29 January the XI Army Corps went ashore at Subic Bay; two days later troops hit at Nasughu. Marinduque, Samar, Mindanao, Caballo, Palawan, Panay, Cebu, and Negros came into the American military orbit as the winter of 1945 passed into the spring. Throughout the Philippine campaigns, Navy Medical Department facilities and personnel functioned as an adjunct to Army medical activities with the invading forces. The over-all campaign was, of course, a joint endeavor, a pooling of effort. Certain aspects of the Philippine campaigns (other than Leyte and Luzon) are of interest in an account of the Navy Medical Department in the Pacific War.

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64. Action Report, Com Luzon Attack Force, p. 79.

The increased use of medically and surgically equipped LST's, for both evacuation and early definitive treatment, was a characteristic of all the later Philippine campaigns. At Panay, where only 19 casualties were removed from the beaches in the landing phase of the campaign, three LST's were equipped to furnish surgical and medical treatment at the beach edge.[65] One of these ships, the LST 613, acted as the main hospital ship for the invasion. It was staffed with 4 doctors, 1 dental officer and 20 hospital corpsmen. At Zamboanga, opposition was also light and casualties were few. Here the LST 459 acted as the chief evacuation and medical aid ship. It was equipped with 174 beds. Only 16 were occupied. The existence of a reef at Zamboanga prevented the beaching of the LST 459, and patients were brought out to the ship in LCM's.[66] At the invasion of Caballo Island in Manila Bay, LST 206 treated 35 casualties in two days. Four medical officers aboard rotated in the tasks of caring for newly arrived cases, operating, and administering anaesthesia in operative cases. It was felt that this plan of rotation and the factor of quick evacuation to the ship from the Army battalion aid station were highly significant in preventing fatalities among the more seriously wounded.[67]

At the Mariveles-Corregidor landings in the middle of February, Navy medical planning was geared to the provision of emergency and definitive major surgical care for all casualties until Army medical facilities

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65. Action Report, ComTask Group 78.3, Panay, p. 26.

66. Action Report, ComTask Group, 76.10, p. 19.

67. Action Report, USS CONWAY (DD507), Caballo Bay, p. 10. (Medical Officer's memorandum to the commanding officer).

were set up on shore. In addition, the Navy provided medical and nursing care for the wounded on the evacuation voyage back to Subic Bay. Once again, major dependence was placed on hospital LST's, and two of these were provided. Surgical teams aboard each of the vessels consisted of 4 doctors and approximately 15 corpsmen. Complete operating room facilities were provided in the troop compartment spaces on the port side. From 15 to 27 February the two ships alternated in providing daily ferry service to the Corregidor area. On 27 February Army facilities ashore were set up to provide for air evacuation. In all, 1,087 casualties were evacuated to Subic Bay by the two LST's, 80 Navy and 1,007 Army personnel. In the post operation reports, special comment was made on the effectiveness of the hospital LST's in rendering immediate aid to wounded, providing adequate shock and antiseptic treatment, and performing major operative procedures.[68] Similar service was rendered by LST's at Negros.[69]

Following the Zamboanga campaign, Admiral Kinkaid commented on the increased use of hospital-evacuation LST's in the Philippine campaigns: "It is not contemplated", he said, "that surgically converted LST's should provide hospital ship standards in handling casualties during amphibious operations. However, they are of great service, and their potentialities should be utilized to the fullest extent."[70]

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68. Action Report, ComTask Group 78.3, Mariveles-Corregidor Landings, p. 32.

69. Action Report, ComTask Group 78.3, Negros, p. 16.

70. Endorsement to Action Report, ComTask Group 78.1, Zamboanga, p. 2.

A second aspect of Philippine campaigns in which the Navy Medical Department had a vital interest was that of dealing with the continuing "kamikaze" hits. All possible measures were taken to save lives and prevent injury. Aboard the USS COLORADO, during an action at Mindoro, the sick bay area was abandoned because of its extreme vulnerability to plane hits, forward under the forecastle deck.[71] The USS COLUMBIA also recommended a change in the position of the sick bay aboard ships of its type.[72] Increased emphasis was placed upon the use of protective and flash proof clothing. This action was a direct result of the high incidence of burn cases in the Philippines area. Recommendations for improved clothing to provide greater burn protection were submitted by ship after ship. Larger amounts of Vaseline gauze were prepared for treatment of burns. A major emphasis was laid on the decentralization of medical supplies aboard vessels of all types.

With the heavy increase in casualties on ships of the line, requests were made for greater numbers of medical personnel. This was especially emphasized aboard destroyer escorts. The DE's were not only vulnerable to "kamikaze" attacks themselves, but they were also frequently used in the rescue of wounded survivors from other ships. No doctor was included in the regular complement of a DE, and the need for a medical officer was easily recognized under these conditions.[73]

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71. Action Report, USS COLORADO, Mindoro, p. 25.

72. Action Report, USS COLUMBIA, Mindoro, p. 13.

73. Action Report, USS JOHN C. CUTLER (DE339), Lamar, p. 15.

The role of the Navy Medical Department in the campaign for the Philippines differed greatly from the action at the Marianas and Carolines. The main functions at the Philippines were to provide care on the beaches and evacuate casualties in the early hours of the operations. The problems of hospitalization and later evacuation were handled by Army personnel. The work called, however, for a close cooperation between the medical staffs of the two services.

In the Philippine battle afloat, line and medical personnel of the Navy were confronted with one of the greatest problems of the war - how to combat the "kamikazes" and provide adequate care for their victims. No over-all solution was found during the Philippine campaign, but every effort was expended to meet the danger with the facilities at hand.

PHILIPPINES

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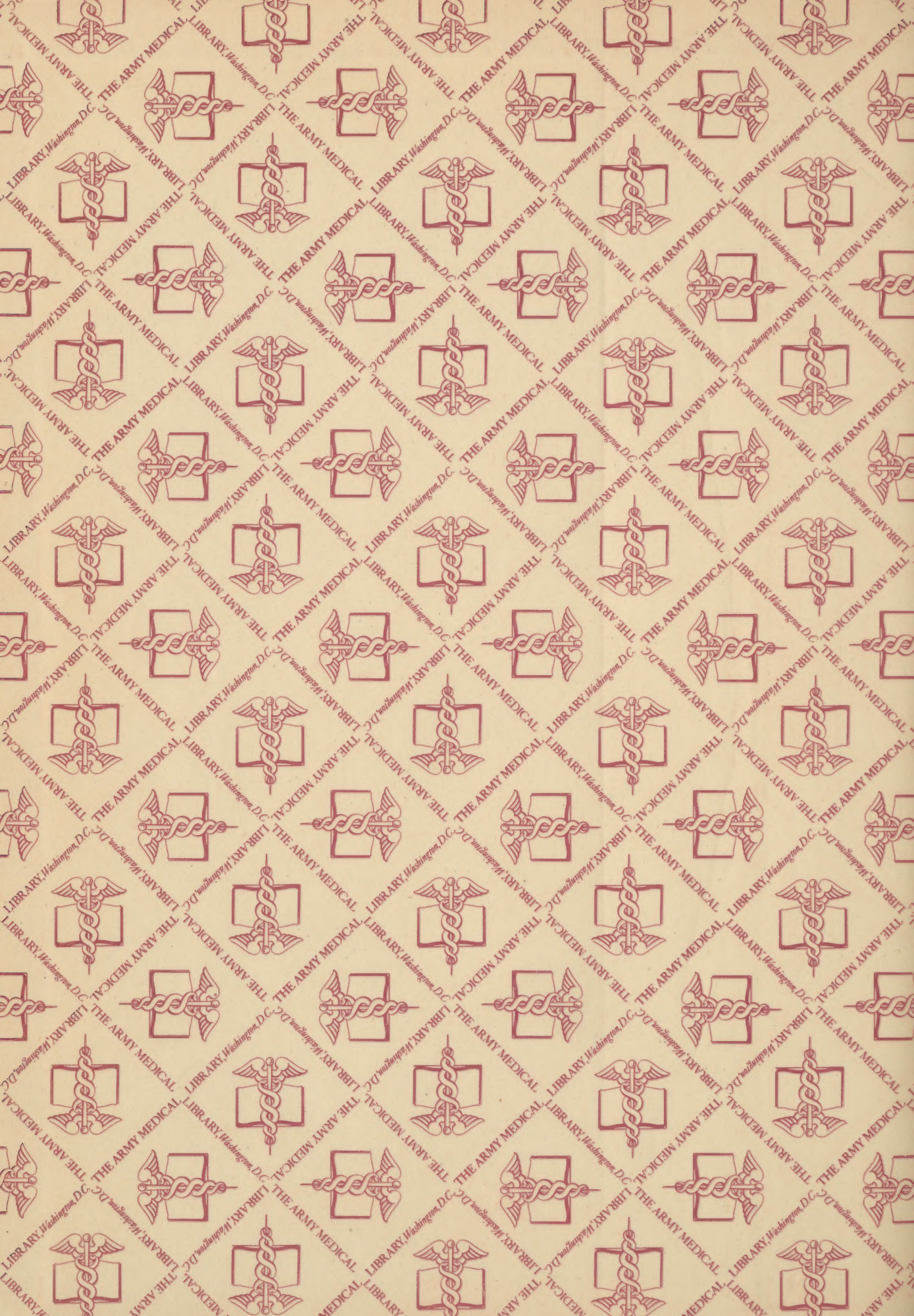
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